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A Contribution to the Origin of Uterine Muscle in Relation to Blood-Vessels.

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IT has been my hope, in undertaking the following investigation, to contribute to our knowledge of the changes which occur in the walls of the blood-vessels of the uterus.

The uterus, in addition to those changes of development, growth, maturity and decline, which it shares in common with other organs, manifests special variations during menstruation, pregnancy and parturition, in all of which the blood-vessels may be, and often are, subject to morbid as well as physiological alterations.

The scope of this paper is that division of the subject which includes the changes in the walls of the blood-vessels in the uterus during its growth and development.

The time during which these changes take place may be subdivided into intra-uterine life, infancy, childhood and youth, which is terminated in the female by the appearance of menstruation and passes into adolescence and the adult state.

Methods. The methods I adopted were as follows:—The specimens were carefully measured with dividers and the measurements recorded; then pieces were cut so as to include the whole thickness of the wall of the uterus.

Portions of ovaries, Fallopian tubes when available, or new growths if present, were selected and placed in a ten per cent. solution of formalin for twenty-four hours, or till fixed; they were subsequently examined by paraffin or frozen sections. Control sections were made from corpus cavernosum penis, bladder, heart and other organs.

For staining I used van Gieson's mixture of the following composition:—

Saturated watery solution of picric acid	100 cc.
Watery solution of one per cent. acid fuchsin ...	10 cc.

This solution should not be permitted to act on the sections for longer than thirty seconds, otherwise the smooth muscle is sometimes coloured red by the fuchsin, and this may lead to error in calculating the percentages of muscle and fibrous tissue.

In my earlier specimens I used hæmalum before staining with van Gieson's stain, but now use iron hæmatoxylin. In the case of sections obtained from all the specimens the above methods were employed; then the sections were treated by washing rapidly in water and passed through methylated spirit, absolute alcohol, cleared with xylol and mounted in Canada balsam.

Sections treated with methylated spirit after staining with van Gieson's stain, omitting to wash with water, exhibit good results.

I have also used the following stains:—Hæmalum and eosin, orcein staining by Unna's modification of the Unna-Tänzar method, methyl-violet, and thionin-blue.

Nile-blue-sulphate was employed for frozen sections which were placed in the solution for one hour, washed in water, differentiated in a one per cent. solution of acetic acid and mounted in Farrant's solution. By this method neutral fat is stained red and acid fat blue.[1]

Weigert's bichromate and hæmatoxylin method. [1 B.]

The proportion of muscular and connective-tissues in the sections has been estimated after staining with van Gieson's stain. Consecutive fields of the sections were estimated under the high power of the microscope through the whole length of the section, using a mechanical stage. The mean of several counts was taken into consideration in the estimation of the result.[2] (Meier.)

I have examined uteri from mice, and made serial sections of the whole organs, from the kitten, guinea-pig, bitch and rabbit, and compared the blood-vessels with those of the human uterus. I have also injected the blood-vessels with carmine-gelatin-mass and Prussian-blue-mass. At first I made use of a brass syringe, and was only partially successful in the case of the guinea-pigs. Later I employed the method of continuous air pressure,[3] and succeeded in obtaining well-injected uteri of rabbits under pressure registered by a manometer.

Fœtal Uteri. The genital cord in the fœtus at the second month is composed of two Müllerian ducts, and by the fusion of these, which begins in the third month, followed by absorption of the resulting septum which is completed by four and a half months, the uterus is formed.

Each Müllerian duct is developed on the outer surface of the Wolffian ridge by a tubular invagination of the mesothelium of the cœlom.

At a very early period the general shape of the organ corresponds to that of the adult type in a remarkable degree. For example, the

anterior surface of the body was flatter than the posterior in all the cases I examined, and in cases 58, 22 and 23 the bladder contained urine when the uterus was removed from the fœtus. Again, the posterior wall of the body is broader than the anterior, the posterior vaginal cul-de-sac is deeper than the anterior, while in the cervix the anterior wall is broader than the posterior from similarly early periods of development.

These points are of value in recognizing the relation of parts seen in microscopic sections.

Developmental changes in relation to blood-vessels observed microscopically.

By the third month of fœtal life small spaces, a few of which appear to contain blood corpuscles, are to be seen in sections. A few broader connective-tissue strands and a large preponderance of delicate connective-tissue are seen in the mesometrium. The percentage of muscular tissue was less than 35. No. 65.

By three and a half months larger spaces with delicate fibrous tissue lining, a few of them containing blood, are found, and fine arteries having the appearance of growing inwards from the broad ligament into the uterus. The arteries lie evenly, and do not curl. By the completion of the fifth month spaces lined with delicate endothelium, and external to this a fibrous tissue layer are observed in transverse and longitudinal sections amongst the cells which compose the uterus. Study by serial sections shows that they are venous spaces.

By five months small curling arteries with an endothelial lining, muscular middle coat and outer fibrous coat are found which appeear to come from the broad ligament of either side. A small number of their branches were found at the periphery of the uteri as displayed in sections. The arteries run in trabeculæ which enclose venous spaces. There are indications of these arteries invading the venous spaces. Nos. 21 and 23.

By seven months, Nos. 22 and 29, venous spaces abound, but the arteries are still mainly in the parts of the uterus near the broad ligaments. In the cervix are indications of a process to which I will later refer in detail under the name of "Condensation," by which the venous spaces of the mesometrium are invaginated by the arteries.

Nos. 26 and 30 were taken from eight months fœti, and in sections obtained from these specimens large venous spaces occur; a few contain a little blood, and into some of them, especially in the cervix, small arteries pushing their way are presented to view. In both specimens the arterial walls present thicker muscular layers and the fibrous tissue of their outer coats is more intricate in its arrangement than in the earlier specimens. The arteries were traced as far as the endometrium.

By the completion of intra-uterine life arterial ingrowth has proceeded as far as the endometrium, in the cells of which a few small arteries are seen, while exceedingly fine and straight capillaries running in the fibrous tissue between the glands may be traced to its surface; small venous spaces, moreover, containing blood are met with in the endometrium.

The mesometrium contains large spaces, the outer of which contain blood, and in some of them the process of condensation in its earlier stages may be seen in sections of body and cervix. Nos. 31, 32 and 33, photographs I. and II.

The inner venous spaces are now separated from the cellular elements of the endometrium only by their coats of thin connective-tissue lined by endothelium.

In the available specimens there is extremely pronounced growth of the muscular tissue of the arteries after they have attained their position in the uterus.

By calculations based on the method of Meier [2] this increase was computed at 28·57 per cent. of its bulk during the later five and a half months of intra-uterine life.

The rate of muscular increase is fairly steady, as will appear from reference to the appended table of fœtal uteri which expresses the above points in a concise form, gives the measurements of the specimens in millimetres, with the percentages of muscular tissue and fibrous connective-tissue in each. In the case of No. 65 the structures were so delicate microscopically that it was not considered advisable in case of error to include the exact percentage of fibrous and muscular tissue.

The embryonic connective-tissue of the mesoderm or mesenchyme from which the several forms of connective-tissue and the unstriped muscular tissue are developed, is regarded as the possible source of the blood-vessels.[5] (Quain.)

Two of the more important views as to the origin of the blood-vessels are:—

(1) That they grow into the embryo from the vascular area by a budding of the endothelial walls of the vessels first laid down there. (His, quoted by Quain)

(2) That they arise in situ.[5] (Quain.)

From the appearances seen in the sections it appears that while the venous spaces arise in situ the arteries grow into the uterus from the broad ligaments, and that there is extremely pronounced growth of the muscular tissue of the arteries within the walls of the fœtal uterus.

During intra-uterine life many anomalies may arise from excess of development, *e.g.*, nævoid growths.[6] (Ashby and Wright.)

The period of early life after birth may be conveniently divided into infancy, childhood and youth.

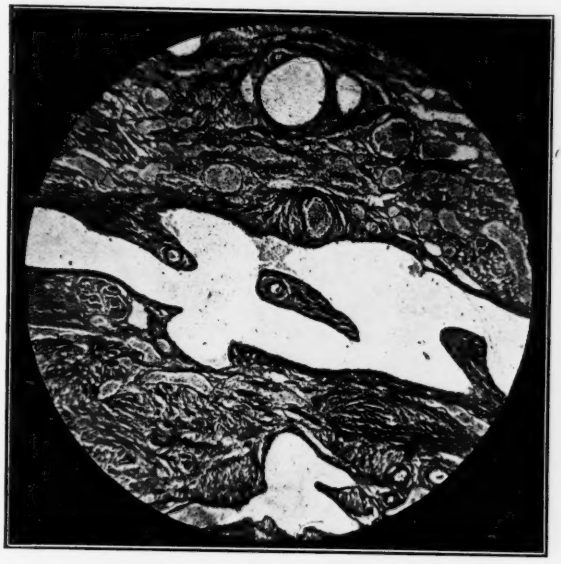

Fig. 1.

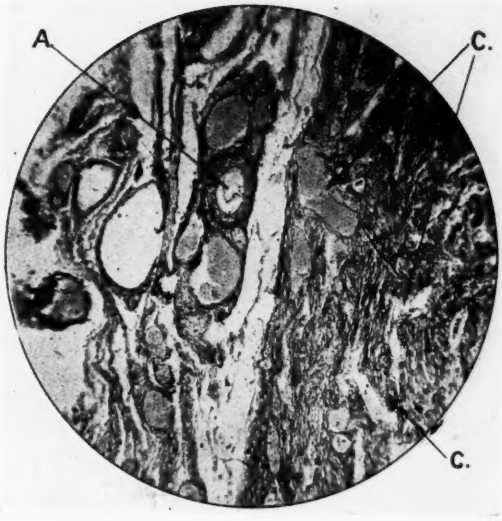

Fig. 2.

Following this plan, I will now discuss the changes in the blood-vessels of the uterus during infancy.

The changes in the blood-vessels of the uterus during infancy, childhood and youth.

Definitions. Infancy is usually defined as the first seven or eight months of life, before the appearance of the milk-teeth. Childhood is the epoch which follows infancy and terminates when the permanent teeth begin to appear at the sixth or seventh year.

Youth follows childhood and ends with puberty, which is associated in the female with the commencement of menstruation, and this usually takes place at the fourteenth year, but sometimes is deferred until a year or two later.[6]

In the last section I referred to a condition met with in uteri during the later months of fœtal life under the term "Condensation."

This condition was exceedingly well-marked in the sections obtained from specimen 9, the uterus from an infant, eleven days old, who died at Pendlebury Hospital from broncho-pneumonia.

The following is a detailed description of this specimen:—

Measurements:

Length of body ... ... 1·25 cm.
Cervix ... ... 2·55 cm.
Mesometrium of the body ... ... 0·3 cm. (behind), rather less in front. In the cervix it measured 0·6 cm. in front, and a little less behind.

The specimen was of a delicate pink colour, and the cervical portion of harder consistency than the body. Paraffin sections were made in the antero-posterior plane of the organ and stained with hæmalum and van Gieson's stain; thus the muscular elements were stained yellow and the fibrous tissue bright red.

On microscopic examination, the mesometrium is seen to consist of a network, enclosing in its meshes large spaces of somewhat irregular outline filled with blood.

The arrangement of the spaces is not regular. They are larger near the fundus, have a delicate lining of endothelium, and, immediately external to this, a fibrous tissue layer. Within the spaces fibrin and corpuscles, many of which are leucocytes, are seen, in the blood which has undergone slight shrinkage from the trabecular walls of the spaces.

The trabecular network consists of smooth muscle together with a little fibrous tissue, and in it small arteries pursue their course and are seen pushing their way from the network into the venous spaces.

By this intrusion of the arteries into the venous spaces the uterus, which, prior to this, appears to have been an organ of a sponge-like

structure, is changed into a much denser condition, and for the moment the term "Condensation" may be applied to the process. On closer observation, the arteries are first seen as projections into the venous spaces, and then they gradually elongate and cross the spaces, pushing before them the walls thereof, so that the invaginated fibrous tissue wall of the vein with its endothelium becomes added to the outer fibrous tissue coat of the ingrowing artery. In older specimens it is thus explained why the arteries of the mesometrium are partly or wholly surrounded by periarterial venous spaces when seen in transverse sections, and in such sections it is often possible to determine from which point the artery has passed into the surrounding veins.

The same kind of process has already taken place in the cervix uteri at a somewhat earlier date than in the fundus, and in that situation owing to the smaller size of the venous spaces "condensation" is more rapidly completed.

Similar changes occur in the venous spaces of the Fallopian tubes and hilum of the ovary, where cavernous arrangement of the venous spaces is also seen, and into some of them small arteries are growing in the manner already described in the mesometrium, but the ingrowing arteries are fewer in number. A few small arteries invading venous spaces were observed at the upper end of the vagina.

Orcein-stained sections show that in this case (No. 9) there is little elastic tissue. Hæmalum and eosin sections were prepared, but do not shed much additional light, although of interest when observed after the interpretation of the van Gieson sections. The same remark applies to sections stained with hæmalum alone, and also to those treated with Leishman's stain.

Transverse and oblique sections were made from the body and the cervix, and in these condensation in progress is well displayed.

It may be mentioned, however, that condensation is best seen in tranverse sections of the cervix, while in the fundus sections in the antero-posterior plane display the condition to greatest advantage. (Photographs III, IV and V.)

I have discussed specimen 9 at some length, since the sections obtained from it afford a clue in the examination of all the infant uteri that have been described for the purposes of this paper, and also in those specimens where condensation occurred in fœtal uteri during the later months of intra-uterine life.

Specimen 72. The uterus of an infant who died at the age of 14 days from bronchitis was divided antero-posteriorly, and longitudinal sections prepared from one-half. Transverse and oblique sections were prepared from the other half in the case of both body and cervix. (See photographs VI and VII.)

The appearances seen in the sections show condensation in the same manner as specimen 9, and a similar description would apply

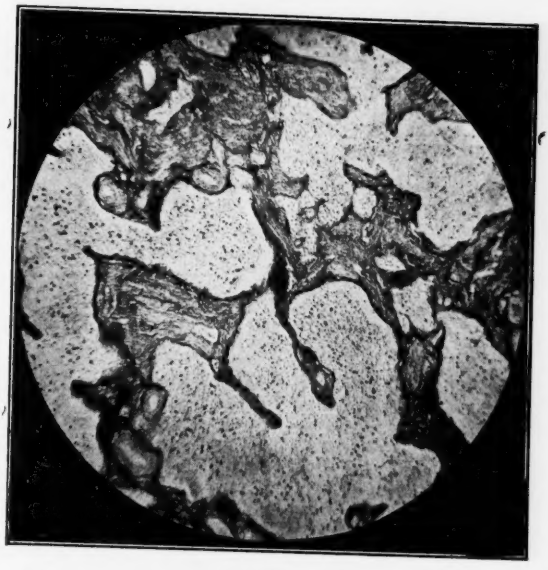

Fig. 3.

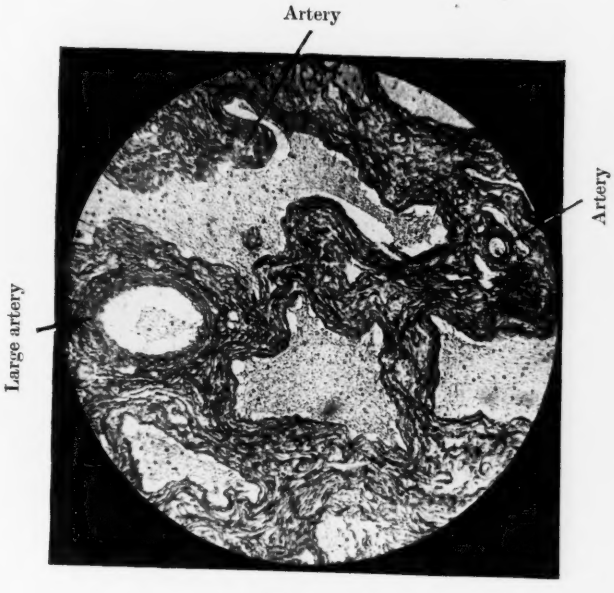

Fig. 4.

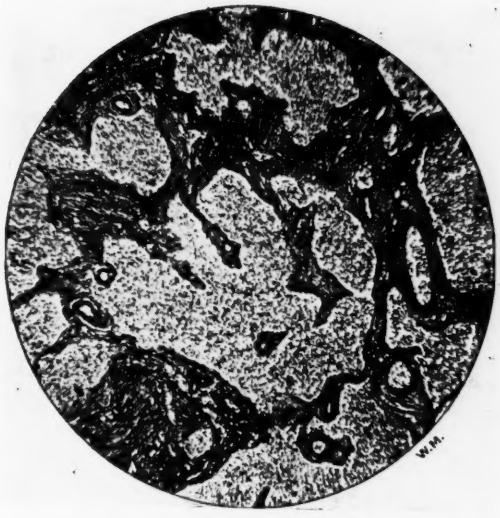

Fig. 5.

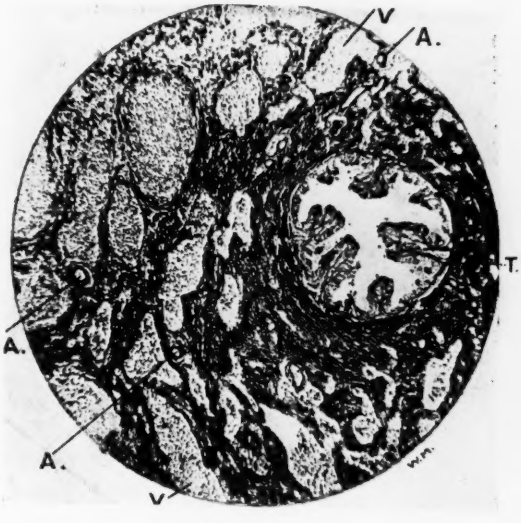

Fig. 6.

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to this specimen. In some of the venous sinuses the opening of the artery into the sinus may be seen.

In specimen 3, longitudinal sections were made from the uterus of an infant who died at three weeks from enteritis. Appearances were found similar to those in specimen 9, but less blood was found in the venous spaces, and the ingrowing arteries have assumed a curly outline, owing perhaps to their rate of growth exceeding that of the containing venous spaces. In some of the sections the same artery may be seen cut two or more times in one venous space, especially in the cervix.

A microphotograph of a portion near the fundus shows that the venous spaces have by this time become reduced in size by the trabeculæ of the mesometrium which are much more bulky in this specimen than in Nos. 9 and 72.

At one or two points in the photograph VIII heaping of the spindle-shaped epitheloid plates of the endothelium lining the venous sinuses may be seen. Similar appearances have been noted in many of the sections usually on the opposite side of a sinus to that from which an artery is pushing into the sinus.

Specimen 70, obtained from a child who died two days after birth from cardiac insufficiency, was a somewhat small uterus. Its greatest length was 1·5 cm. I have purposely described the specimen at this stage because it presents some different features to Nos. 9, 72 and 3 above described.

Antero-posterior sections were stained with van Gieson's stain, and microscopically the mesometrium is found to consist of cavernous-like tissue, but on a very delicate and small scale. Professor J. Lorrain Smith, who kindly examined the sections for me, considered the mesometrium entirely made up of vascular structures.

By careful examination condensation in progress may be seen.

The cavernous tissue of the body of the uterus becomes a thin layer as it approaches the cervical region, giving the appearance of a cap-like mass of cavernous tissue resting upon the tissues of the cervix.

In the cervix the same kind of appearance is seen in transverse sections.

A few very small arteries and venous spaces are seen in the endometrium.

A photograph (X) of the whole thickness of the uterine wall near the fundus demonstrates the above points sufficiently well.

Specimen 67, the uterus of a child who died at five weeks from nephritis, measured 2·5 cm. long, was pale pink in colour, and of firm consistency.

Sagittal and oblique sections were made from the body and transverse sections of the cervix uteri, Fallopian tube and hilum of

the ovary, all of which show condensation in a more advanced stage than in the earlier specimens, but still incomplete, especially at the peripheral portions of the sections. The arteries and venous spaces contain blood.

In Nos. 51 and 52, from infants 14 and 15 weeks respectively, cavernous venous spaces exist near the fundus, especially on the posterior wall of the body. The uteri are more compact on section, and in the lower part of the body and in the cervix condensation is almost complete. The arteries and veins contain blood.

No. 71. The uterus was that of a child who died at ten months from early tuberculosis. Sections show the arteries, whose muscular coats are much thicker than those of the specimens last described, and whose fibrous coats more complex in arrangement, for the most part filled with blood corpuscles. The veins are still further reduced in size; many of them contain blood. The structures are on a small scale. The photograph (XI) does not show these points as well as the sections.

Nos. 69, 34 and 35. Specimens taken from children between the ages of 15 and 18 months show varying degrees of cavernous tissue which is gradually decreasing in amount. The great increase in the percentage of muscular tissue of some of these uteri, especially No. 35, is worthy of note.

No. 68. A specimen removed from a child of 17 months who died of meningitis. Near the fundus cavernous spaces exist, more especially in the posterior wall, and many of these contain blood corpuscles. For the most part, however, they are reduced to slit-like spaces.

A photograph (No. XII) shows arteries cut more than once in the same venous space, and the relation of the peri-arterial sinus. This is due to the artery curling in the venous sinus to accommodate itself to the shape of the sinus.

In the lower part of the photograph is an artery cut for the most part longitudinally, displaying varying amounts of its lumen. At the sides of this artery slit-like spaces are seen, the remains of venous spaces. It will be observed that these spaces are not symmetrical on the two sides of the artery.

I have noted similar appearances in many of the arteries divided in their length.

Specimen 10. The uterus of a child, of four years, who died of general tuberculosis. Greatest length 2·6 cm. Sections of this uterus have cavernous venous spaces near the fundus, especially in the posterior wall. Elsewhere the venous spaces have become more flattened and appear slit-like in sections.

Sections prepared from the Fallopian tube show cavernous tissue and condensation in progress.

No. 36. The specimen was that of a child of 6 years; the cause

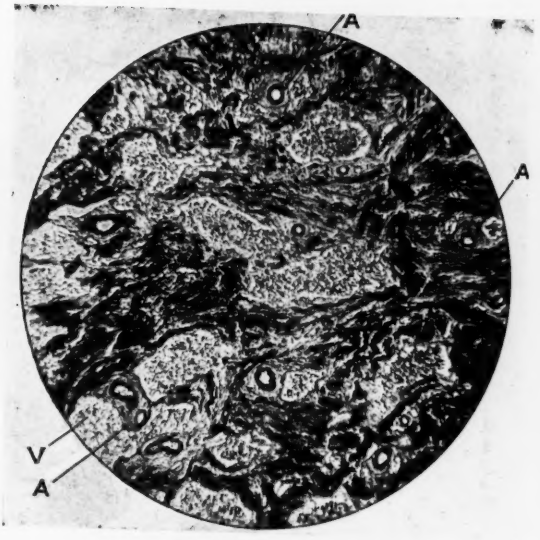

Fig. 7.

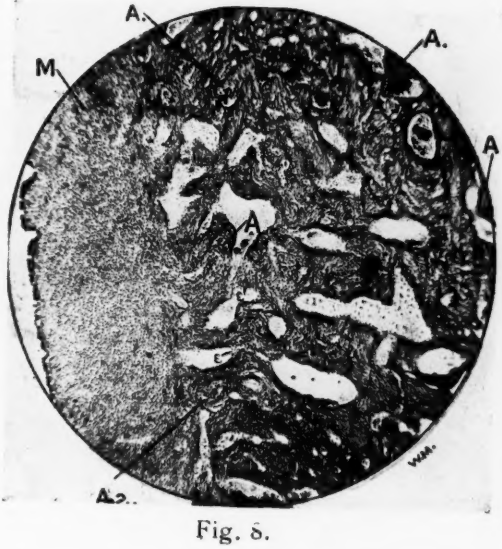

Fig. 8.

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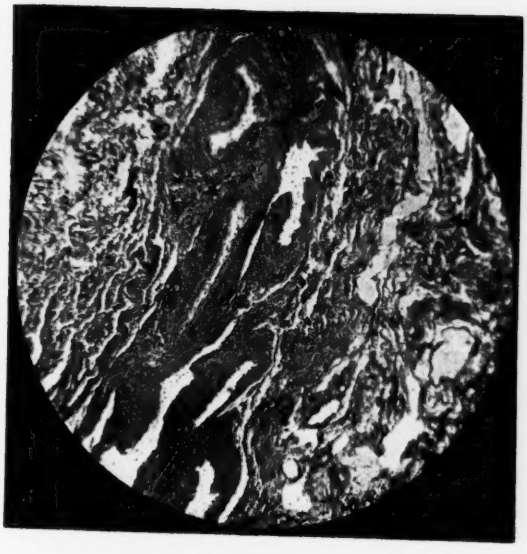

Fig. 9.

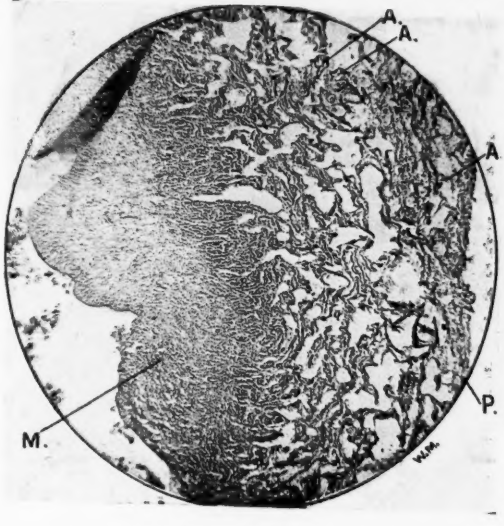

Fig. 10.

Artery bent on itself. Note the slit-like sinus round it, V.

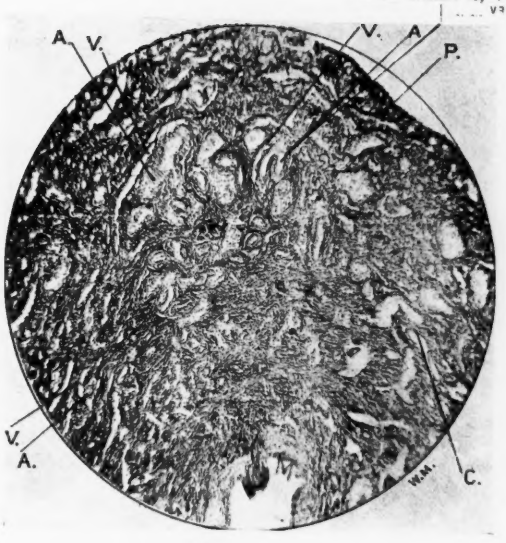

Fig. 11.

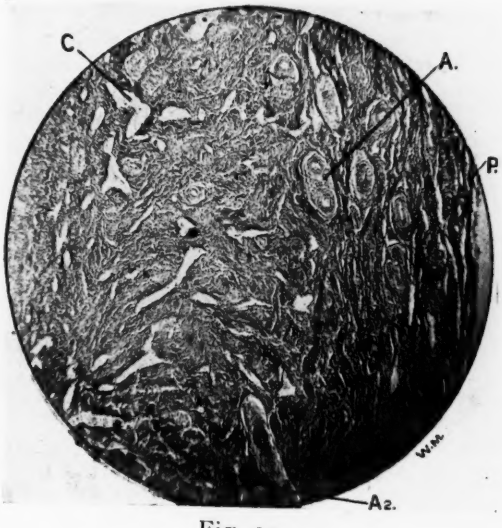

Fig. 12.

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of death I do not know. The greatest length was 2·8 cm. The fibrous tissue in the sections obtained from this uterus has a more intricate arrangement around the arteries.

The venous spaces are small, as described in the last specimen (No. 10). Condensation is almost completed throughout the mesometrium.

A table is appended giving the age, measurements in centimetres, cause of death when known and other points of possible interest. Moreover, the percentage of fibrous tissue and smooth muscle has been carefully ascertained for each specimen by Meier's method.

During early life there is an increase in the amount of muscular tissue in the uterus from 45 per cent. at birth to 52 per cent. at the time of the appearance of the permanent teeth, or the end of the period of childhood. This amounts to an increase in the amount of muscular tissue by 15·55 per cent. of its bulk.

A band of smooth muscle has been mentioned which is met with at the anterior surface of the cervix uteri. It extends across the front of the cervix, and, owing to its presence the anterior portion of the cervix measures more than the posterior part. It cannot be distinguished from the cervix uteri by naked eye examination, but microscopically it stains, with van Gieson's stain, a somewhat paler yellow than the smooth muscle of the uterus.

Control sections were made from the bladder, and the band of muscle under discussion resembles bladder muscle in arrangement and manner of staining.

The fibres are arranged for the most part longitudinally, and have the appearance in sections of joining the trabeculæ of the cervix behind. Again, some of the fibres join the fibrous connective-tissue of the peritoneal covering of the body of the uterus above, while in front fibres pass into the fibrous tissue of the wall of the bladder. Below, the muscle band appears to join the fibrous connective-tissue between the bladder and vagina. Contraction of such a band of muscle, which was constantly found in young specimens, would diminish the capacity of those blood-channels in the walls of the uterus whose fibrous connective-tissue coat is joined by fibrous connective-tissue that is pulled upon when the muscle band contracts. Its relaxation would relax the walls of the blood-channels and increase their capacity.

Youth follows childhood and ends with puberty. During this period of life the blood-vessels of the uterus exhibit greater complexity in the arrangement of their fibrous elements. The fibrous connective-tissue is more wavy in outline, and the smaller blood-vessels appear increased in number, especially in the endometrium.

Unfortunately, my specimens 66, 56 and 8 were from subjects who died from tubercular disease, and the muscular percentages appear to be below that of normal uteri of the same age. A marked

feature in these uteri was splitting of the connective-tissue fibres. It appears from other writings that an advance from 52 to 62 per cent. of muscle normally takes place in the period of youth. This gives an increase of 19·2 per cent. in bulk of muscle, and appears to to be greatest about the time of puberty, which is characterized by general as well local muscular development, a marked increase in size of the sexual organs and menstruation.

Adolescence is the period between puberty and maturity. When menstruation normally appears for the first time the muscular tissue in the uterus was estimated at 62 per cent., and if 21 years be taken to represent the age of maturity there is a further increase in the uterine muscle of 3 per cent.

The uterus from which this increase was estimated was that of a nullipara, aged about 21 years, and calculation gave muscle 65 per cent., fibrous connective-tissue 35 per cent. This increase expressed in percentage of muscular bulk is equivalent to 4·83 per cent. The practical bearing appears to be that the uterus is a somewhat more efficient muscular organ at maturity than at the time of puberty.

Injected specimens. I have not been able to obtain an infant sufficiently soon after death for the purpose of injecting its blood-vessels, but injected some of the smaller animals from the heart immediately after death, and employed carmine-gelatin-mass in some animals, and Prussian-blue-mass in others.

Sections from the uterus and ovaries were afterwards prepared, and some were examined without staining, while other sections were stained with picrocarmine in the case of those where Prussian-blue-mass had been used for the injection.

These sections show that the number of blood-vessels in the uteri of animals is very large. In the case of three adult guinea-pigs injected venous sinuses around the arteries of the mesometrium were found, while similar sinuses in an uninjected specimen used as a control appeared microscopically as almost indiscernible slits. Some of the blood-vessels were only partially filled with injection-mass in the sections obtained from guinea-pigs. A kitten of three weeks, a rabbit eight weeks old, and four adult mice were also injected with Prussian-blue-mass.

Three adult rabbits injected with carmine-gelatin under continuous air pressure [3] enabled me to obtain well-injected sections of the uterus and appendages. In these large venous spaces, filled with red injection-mass, some partly peri-arterial, and others with arteries dipping into them, are well seen in the mesometrium.

Microphotograph XIII from one of these sections, taken transversely across the uterus, shows the arrangement of the small vessels of the endometrium running in its substance and forming loops under its surface.

In the mesometrium large venous spaces filled with red injection-

Fig. 13.

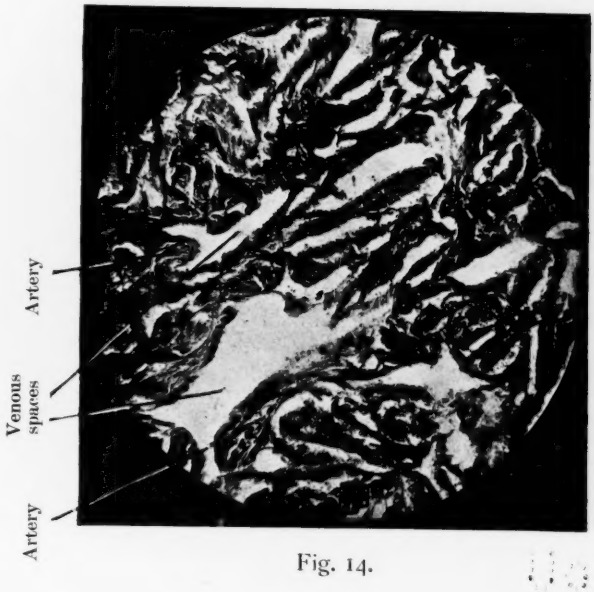

Fig. 14.

mass, some of them peri-arterial, are displayed, and into some of them arteries project. To the left of the photograph the capillaries of the peritoneum are well seen. A little nearer the broad ligament large venous spaces, similar to those in the upper part of the photograph were more numerous. The black lines are for the most part the injection running in small arteries which appears as dots when the arteries are divided transversely.

Similar large venous sinuses were well injected in the hilum of the ovary in the same rabbits. The value of injected venous spaces is to show that the arteries communicate with them, and also to indicate vessels and blood spaces which would be overlooked if examined by other methods.

Sections from corpus cavernosum penis. In two specimens very little blood was found in the venous sinuses. The sections, owing to this, do not at first sight resemble the section of corpus cavernosum as figured in text-books, where it is usually depicted with the venous sinuses filled with blood.

In photograph XIV the arrangement of the arteries and venous spaces is well seen, and the appearances have a striking resemblance to those seen in sections from infant uteri, especially those in which little blood is present in the blood-vessels.

To summarize the results. Twelve fœtal specimens were examined, and in nine of them arteries were found which appeared to grow into the uteri from the broad ligament of either side. Indications that the endometrium is built up of trabeculæ enclosing venous spaces were also found in nine uteri with condensation in progress. Condensation was more evident towards the end of fœtal life. Of fourteen infant uteri cavernous tissue composing the mesometrium, with condensation taking place in its meshes, was well marked in six specimens, while in seven others it was easily recognized.

It is interesting to compare the trabecular condition found in the developing uterus with the trabecular condition which occurs in the fœtal heart of man and that which persists throughout life in some amphibians, *e.g.*, the frog. It has already been compared with the structure of the corpora cavernosa penis.

Quain [5] and Keith [4] have described the condition found in the fœtal heart as a trabecular sponge-work. The heart and uterus have many points in common, and their comparison is an often repeated physiological exercise.

Increase of muscle percentage in the uterus. During the latter five and a half months of fœtal life the increase of muscle was estimated at 28·57 per cent. of its bulk. From birth to the end of the period of childhood the percentage of increase was 15·55, followed by a further increase of 19·2 per cent. in bulk of muscle during the epoch of youth and 4·83 per cent. in the period of

adolescence. The percentages were calculated independently for each period.

Arrangement of structures. In the fœtal and infant uteri the cavernous vascular structure of the body is more abundant at the fundus, tapers as it is traced towards the cervical region, and overlaps the cervical structures which have a somewhat different arrangement.

The microscopic appearances suggest that the cavernous tissue of the fundus is continuous with the outer layer of the Fallopian tube and is supplied by the ovarian arteries.

The outer layer of the cervix uteri appears in coronal and sagittal sections to be continuous with the outer layer of the vaginal wall.

In the bicornute uteri of the animals enumerated in the section on injected specimens a longitudinal outer muscular layer could be traced from Fallopian tube down the uterus to the side of the vaginal wall. In these uteri, and also in the older human specimens, I was unable to find more than two muscular layers—an inner, for the most part circular, and an outer longitudinal layer.

Conclusions.

1. During fœtal life the uterus has a trabecular arrangement, and the arteries appear to grow into the trabeculæ from the broad ligament. The venous spaces seem to arise *in situ*.

2. There is extremely pronounced growth of the muscular tissue of the arteries in the uterus. This increase was computed at 28·57 per cent. during the later five and a half months of fœtal life, and 15·55 per cent. from birth to the end of the period of childhood.

3. During infancy a cavernous condition exists in the mesometrium, and by arterial invasion of the venous spaces the condition of the adult uterus is attained. This process, which I have called "Condensation," is completed by the end of the period of childhood—six to seven years.

4. Cavernous tissue and condensation were observed in the wall of the Fallopian tube, and to a slight extent in the vascular structures of the vaginal wall.

5. The cavernous tissue of the mesometrium is similar to that which exists in erectile tissues, *e.g.*, corpora cavernosa; also to the sponge-work in the fœtal heart of man and the adult heart of some amphibians.

6. The venous spaces in the cavernous tissue of the human uterus are not obliterated, but remain as potential rather than actual spaces. They have a delicate endothelial lining, and external to this a fibrous connective-tissue layer. They are concerned in erection of the uterus and in the formation of maternal blood sinuses during pregnancy.

7. The development of uterine muscle during fœtal and infant

life takes place in definite relation to vascular structures. In other words, it is in the development of muscular tissue in the trabeculæ of the meshwork of cavernous structures and the muscular growth in the walls of the arteries that the growth of the mesometrium takes place.

8. Injected specimens show that the arteries communicate with the venous spaces, and also serve to indicate the great vascularity of the uterus in animals.

This research was conducted in the Pathological Department of the University of Manchester, and I desire here to express my indebtedness to Professor J. Lorrain Smith for his kindly advice during the course of my investigations.

In 1909 I read a portion of this subject before the North of England Obstetrical and Gynæcological Society,[8] and have since continued the work in the Pathological Department of the Manchester Northern Hospital; and I wish cordially to thank those of my colleagues who have assisted me to collect the material for this paper.

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Fig. 1. Transverse section of the cervix of a nine months' fœtus. Specimen 32. Note veins, some of which contain blood, lined with a fibrous connective tissue layer, internal to which is delicate endothelium. There is a venous sinus extending across the photograph into which arteries with definite muscular coats are projecting. There is an irregular venous sinus below into which arteries project. Stained hæmalum and van Gieson ×50.

Fig. 2. Specimen 33. Transverse section of the body of the uterus from a fœtus at term. A. Ovarian artery with definite muscular coat surrounded by veins, in whose walls no muscle is seen. Note the manner in which the fibrous coat of the artery is connected with the fibrous coat of the veins. C.C.C. Arteries growing into venous spaces which contain blood. Stained iron hæmatoxylin and van Gieson's stain ×50.

Fig. 3. Saggital section from mesometrium of the body of the uterus of an infant aged eleven days. No. 9. Note the venous spaces formed by a trabecular network. The venous spaces are lined by endothelium and outside this have a layer of delicate fibrous connective tissue. Inside the spaces is blood which has undergone slight shrinkage and in it are a large number of leucocytes. The arteries have well marked muscular coats and are seen projecting into the venous spaces, varying distances, and pushing before them the lining fibrous connective tissue and endothelium of the venous spaces. "Condensation." Stained hæmalum and van Gieson's stain ×50.

Fig. 4. Longitudinal section of Fallopian tube from infant, eleven days. No. 9. Note large artery to the left and other arteries projecting into venous spaces. Stained hæmalum and van Geison ×50.

Fig. 5. Sagittal section from No. 9. Body of uterus of infant, eleven days. Note arteries running in trabeculæ and others projecting into irregular venous sinuses. This photograph is taken from structures a little nearer the cervix than the preceeding photograph. Stained hæmalum and eosin ×50.

Fig. 6. Specimen 72. Sagittal section of the body of the uterus near the intra-uterine portion of the Fallopian tube T. Infant, fourteen days. Note trabeculæ enclosing venous spaces V.V., containing blood. A.A. Arteries growing into venous spaces. Stained hæmalum and eosin ×50.

Fig. 7. Specimen 72. Sagittal section from the body of the uterus of an infant who died at fourteen days. The photograph is taken nearer to the cervix than the last photograph. The venous spaces here are full of blood, but are arranged more horizontally than near the fundus. Note the arteries A. growing from the trabeculæ into the venous spaces V. "Condensation." Stained iron hæmatoxylin and van Gieson's stain ×50.

Fig. 8. Sagittal section from specimen 3. The body of uterus of an infant of three weeks. M. = mucous membrane, in which are a few fine blood-vessels. Note that the trabeculæ are thicker in the mesometrium than in earlier specimens. A.A. Arteries pushing into venous spaces. A.2. Artery divided twice in one venous space. E.E. Heaping of endothelium. Stained with hæmalum and van Gieson's stain ×50.

Fig. 9. Longitudinal section of Fallopian tube from an infant, aged three weeks. Specimen 3. Condensation on a small scale seen to left and right of the photograph. Near the centre the blood-vessels are on a larger scale. The vessels contain blood. Stained hæmalum and van Geison ×50.

Fig. 10. Specimen 70. Sagittal section of posterior wall of uterine wall near fundus. Note condensation in progress in the mesometrium on a very small scale. M. Endometrium, in which a few exceedingly fine blood-vessels may be seen. A.A. Arteries. P. Peritoneal surface under which a considerable layer of fibrous connective tissue is visible in the section. Stained iron hæmatoxylin and van Gieson's stain ×50.

Fig. 11. Uterus from infant, ten months old. The venous sinuses are reduced to slit-like spaces around the arteries which have now relatively thicker muscular coats. A. Artery. V. Venous sinus. P. Peritoneal surface. Note fibrous connective tissue is abundant under the peritoneum. C. Condensation in progress. M. Endometrium. Stained iron hæmatoxylin and van Gieson's stain ×50.

Fig. 12. No. 68. Sagittal section from body of the uterus of a child, aged ten months. Note venous sinuses reduced to periarterial slits. A. Artery divided twice in same venous sinus. C. Cavernous venous spaces, with arteries growing into some of them. A.2. An artery cut longitudinally, with slit-like venous spaces arranged asymmetrically at the sides of the artery. Stained iron hæmatoxylin and van Gieson's stain ×50.

Fig. 13. Uterus of an adult rabbit injected with carmine gelatin by continuous air pressure. Note arrangement of the fine blood-vessels of endometrium M. Of the peritoneum P. Venous sinuses V. into some of them arteries A project. The section was not stained ×50.

Fig. 14. Transverse section corpus cavernosum penis. Arteries seen projecting into irregular venous spaces. The spaces are lined by endothelium, and outside this have a fibrous connective tissue layer. They contain no blood. The resemblance to those sections of infant uteri, where little blood was present in the sections, should be noted. Stained iron hæmatoxylin and van Gieson's stain ×50.

Table of Uteri from Subjects who die

Number.	Age and cause of death.	Length of Uterus.	Length of 1. Body. 2. Cervix.	Length of Cavity.	From tube to tube.	Antero-posterior measurement at same level.	Meso-metrium. 1. Body. 2. Cervix.	Endo-metrium.	Remarks.	Calculation. 1. Fibrous tissue. 2. Smooth muscle.
70	2 days cardiac	1·5	0·5 0·1	1·2	1·2	0·5	0·2 0·3	0·1	Uterus small for age	48 52
9	11 days Broncho-pneumonia	3·8	1·25 2·55	3·5	1·6	0·7	0·3 0·6	0·1	Uterus large for age	47·7 53·3
72	14 days Bronchitis	3·3	1·4 1·9	3·0	1·6	0·6	0·3 0·5	0·1	Uterus large for age	48 52
3	3 weeks Enteritis	3·2	1·5 1·7	3·0	1·4	0·6	0·2 0·4	0·1	Uterus large for age	49·4 50·6
67	5 weeks Nephritis	2·5	1·3 1·2	2·3	2·0	0·5	2·2 0·4	0·1	Uterus small for age	48 52
51	14 weeks Suppurative Meningitis	2·5	1·25 1·25	2·3	1·25	0·6	0·2 0·3	0·1	Uterus small for age	52·1 47·9
52	15 weeks Diarrhœa of pancreatic origin	3·2	1·25 1·95	2·9	1·4	0·5	0·2 0·4	0·1	Uterus long and narrow	50 50
71	10 months Early Tuberculosis	2·0	1·0 1·0	1·8	0·9	0·5	0·2 0·4	0·1	Uterus small	47 53
69	15 months Meningitis	2·8	1·3 1·5	2·6	2·2	0·4	0·15 0·3	less than 0·1	Uterus long and narrow	46·5 53·5
68	17 months Meningitis	2·1	1·0 1·1	1·9	1·5	0·5	0·2 0·3	0·1	Uterus small	46·3 53·7
34	17 months	?	?	?	?	?	0·1	0·1	Sections made from paraffin blocks lent to me	45 55

culation. Fibrous tissue. Smooth muscle.	Colour and Consistency.	Source.	Condition of the Blood-Vessels.
48 52	nk body, rvix pale d firm	Northern Hospital, No. 21	Condensation of cavernous tissue occupies the whole of the mesometrium near the fundus. The vessels are small, and have very little blood in them.
47·7 53·3	nk body, m	Dr. Mair, Pendlebury Hospital, No. 147	The mesometrium consists of venous spaces which are full of blood—into which the arteries are projecting. In cervix the blood-vessels are on a smaller scale; cavernous tissue is also seen in the Fallopian tube. Note large size of this and two following specimens.
48 52	nk body, m	Dr. Mair	Similar to 9.
49·4 50·6	nk, appendages rker, firm	Dr. Mair	Condensation progressing is well seen in the sections nearly completed in the cervix where the venous spaces are smaller than in the body. The arteries which contain blood are more curly, and the same artery may be cut two or three times in one venous space. Some of these spaces contain blood, but not all.
48 52	le pink, m	Northern Hospital, No. 7	Sagittal and oblique sections of the body, transverse sections of the cervix and Fallopian tube all show process of condensation which is more advanced than in earlier specimens, put still incomplete, especially at periphery of the sections.
52·1 47·9	nk, soft	Dr. Mair	Cavernous condition exists near fundus; condensation has taken place nearer the cervix. Arteries and venous spaces contain blood.
50 50	d, soft	Dr. Mair	Similar to 51.
47 53	nk, soft	Northern Hospital, No. 25	Longitudinal sections of body show arteries which contain blood in every stage of condensation; the veins also contain blood. Transverse sections of the cervix show condensation in the outer parts of the sections which are highly vascular.
46·5 53·5	hole uterus le and firm	Northern Hospital, No. 14	Condensation advancing in body, especially on posterior wall of body near the fundus. The veins and arteries contain blood corpuscles in abundance.
46·3 53·7	nk body, rvix pale	Northern Hospital, No. 10	Cavernous venous spaces occur in the body; also in the cervix. Condensation more advanced. Blood in venous spaces, and also in arteries.
45 55	nk	Dr. Shaw	Cavernous tissue found to one side of the sections. Condensation in progress almost as far as the mucous membrane.

Table of Uteri from Subjects who die

Number.	Age and cause of death.	Length of Uterus.	Length of 1. Body. 2. Cervix.	Length of Cavity.	From tube to tube.	Antero-posterior measurement at same level.	Meso-metrium 1. Body. 2. Cervix.	Endo-metrium.	Remarks.	Calculation. 1. Fibrous tissue. 2. Smooth muscle.
35	18 months	2·54	?	?	?	1·57	2·5	0·5	Do.	34·6 65·4
10	4 years Early Tuberculosis	2·6	1·2 1·4	2·4	1·5	1·3	0·3 0·4	0·3	—	48·2 51·8
36	6 years	2·84	?	?	1·42	?	1·5	0·5	Do.	48·7 51·3
66	11 years General Tuberculosis	3·3	1·3 2·0	2·9	2·2	0·7	—	—	Uteri small for age.	42 58
56	14 years Tuberculosis	3·3	1·3 2·0	3·1	2·0	0·6	0·2 0·3	0·1	Micro-scopically	44 56
8	15 years Tuberculosis	3·3	1·6 1·9	3·0	1·3	0·9	0·4 0·4	0·5	much more compact than the younger specimens	45 55

n early life. Measurements in c.m.

Colour and Consistency.	Source.	Condition of the Blood-Vessels.
?	Dr. Shaw	Condensation in progress, especially near the outer part of the sections of the cervix.
ink cervix, arder than e body	Dr. Mair	Cavernous spaces near fundus, especially in the posterior wall; blood in both arteries and venous spaces; elsewhere the veins are becoming more flattened and appear slit-like on section. Sections from tube show condensation in progress.
?	Dr. Shaw	Fibrous tissue around arteries has much more intricate arrangement. The arteries are curling and cut two or three times in one venous space, still further reducing their size.
—	Northern Hospital, No. 2	The organ is becoming more like the adult uterus microscopically, but on a smaller scale. The same applied to the blood-vessels.
nk specimen, ft	Dr. Mair, 5989	Similar to 66. Splitting of fibrous tissue strands into fibrillæ; the same seen in Nos. 66 and 8.
le, hard	Royal Infirmary, 5834	The ovaries were perfectly smooth. Menstruation had not taken place. Blood-vessels similar to 66.

Table of Fœtal Uteri.

Number	Age in Months	Greatest thickness of meso-metrium in m.m.	Greatest thickness of endo-metrium in m.m.	connective tissue percentage	muscular tissue percentage	Condition of the blood-vessels
			less than	more than	less than	
65	3	0·3	0·1	65	35	Small spaces, some of which contain blood.
64	3½	0·5	0·1	64·9	35·1	Small spaces, some of which contain blood; a few small arteries seen in the sections.
58	3½	0·5	0·1	65	35	Small arteries appear to be growing into uterus from the broad ligament. Arteries are not curling.
21	5	1·0	0·5	60	40	Veins are seen to be lined with endothelium, and a fine layer of fibrous tissue outside this. Small arteries of curling outline appear to be passing from broad ligament into uterus. Septum of the uterus is still present in part. Indications of condensation.
23	5	1·0	0·4	63	37	Similar to No. 21.
22	7	2·5	0·5	59	41	Indications of condensation progressing. Groups of arteries are for the most part at the outer part of the uterus.
29	7	3·0	0·7	58	42	Arteries ingrowing from broad ligament seen in the cervix, condensation progressing is found in transverse sections of the cervix.
26	8	3·0	0·4	59	41	Large venous spaces which are occupied by arteries in the sections. A number of spaces near fundus not yet invaded by arteries.
30	8	3·0	0·5	60	40	Arterial walls acquiring thicker muscular coats and fibrous coats more complicated in their arrangement. Cavernous tissue seen at sides of the uterus.
31	9	4·0	0·2	67·5	32·5	Fine capillaries can be traced to the surface of mucous membrane, where they appear to form fine loops. Condensation seen, especially at the outer part of the mesometrium.
32	9	4·0	1.0	55·8	44·2	Similar to 31.
33	9	4·0	0·8	53·1	46·9	Similar to 31.

Tuberculous Pyosalpinx.*

By

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The whole question of tuberculosis of the tube is an interesting and important one. It is frequently found on opening the abdomen that tuberculous tubes are present with no evidence of the presence of tuberculosis elsewhere in the pelvic or abdominal cavities. Or it may be found that in general abdominal tuberculosis the tubes are extensively affected, and have apparently been the primary focus of disease. Whether the condition is really primary in the tube or not is a very difficult question to decide, and as yet no definite conclusion has been arrived at. It is difficult to exclude a blood or lymphatic infection from a distant focus, say, in the lung or in mesenteric glands. Whilst we cannot give an opinion on this point, the routine examination of three cases of large tuberculous pyosalpinx has given interesting results, which we propose to illustrate.

Case I. Mrs. B., age 36, nullipara. For nine years the patient has had a dull pain in the abdomen, specially marked in the right iliac fossa. During the last four years these pains have been more severe, with shorter intervals between the attacks. For the past three years she has noticed a swelling in the abdomen, situated apparently, as she described, in the middle line. Her general health has been good, and she has not got thinner of late years. Menstruation has always been irregular: intervals varying from 5 to 8 weeks, duration 3 days, amount of loss moderate. There was seven weeks' amenorrhœa previous to admission. For the past two years there has been a yellowish leucorrhœa with no odour. There have been no pregnancies. She is a well-nourished, healthy woman, with abundant subcutaneous fat. There is no rise of temperature.

* Read before the Edinburgh Obstetrical Society.

The abdomen is distended to the size of a six months' pregnancy. On palpation a rounded swelling is felt, filling up the lower part of the abdomen and reaching almost to the umbilicus. This swelling is dull on percussion and semi-fluid to feel. On vaginal examination the os is nulliparous, pointing backwards, and bimanually the uterus can be felt through the anterior fornix, freely movable and not enlarged. A tense cystic swelling can be felt filling up the fornices of the vagina and extending above the brim of the pelvis behind the uterus.

On opening the abdomen a tumour, the size of a small melon, was felt extending out of the pelvis. It was folded on itself, and on tracing it downwards was found to be a dilated tube. The isthmus was partially twisted, but was undilated. The other tube was also distended, but to a less degree, and lay below the right tube towards the pouch of Douglas. There was an omental adhesion to the larger tube, and adhesions were present between each tube and the corresponding ovary. Both tubes and ovaries together with the uterus were removed, the latter being amputated at the level of the isthmus. The peritoneum of the pelvic floor was stitched in the usual way, and the abdomen closed. The patient made an uninterrupted recovery.

The specimen consists of the uterus amputated at the level of the isthmus together with both tubes and ovaries (Fig. 1).

The left tube is tortuous, dilated in the ampullary and infundibular regions, and the fimbriated end is occluded and adherent to the ovary. The isthmic portion is of normal thickness. The whole tube measures six inches in length and three inches in circumference at its widest part.

The right tube is enormously dilated in the ampullary and infundibular regions forming a large tumour measuring 13 inches in length and 10 inches in circumference. The swelling is folded on itself, and there are peritonitic adhesions between the folds and also tags of adherent omentum. The colour is greyish-red, and on the surface are slightly raised areas about the size of sixpence which are distinctly calcareous. There are no recent tubercle nodules on the surface. In consistence the swelling is semi-fluid, and on opening its content is found to be glairy mucus rather turbid in colour.

Both ovaries are enlarged and cystic. The right is free from adhesions, but the left is adherent to the tube and is covered with adhesions which had been separated from the abdominal structures. The uterus is slightly enlarged, contains no visible nodules or tubercles and has no adhesions.

Microscopic Examination.

Left Tube—Part next uterus only slightly dilated. On transverse section it is seen that the mucous membrane is greatly thickened by

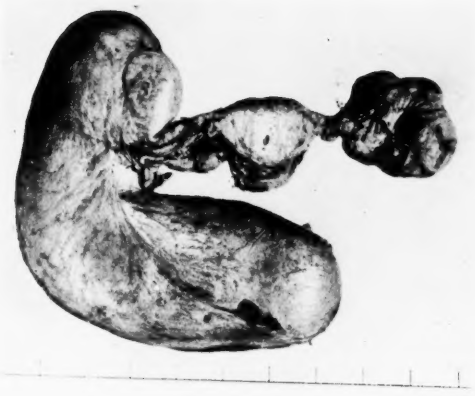

Fig. 1.

Fig. 2.

Fig. 3.

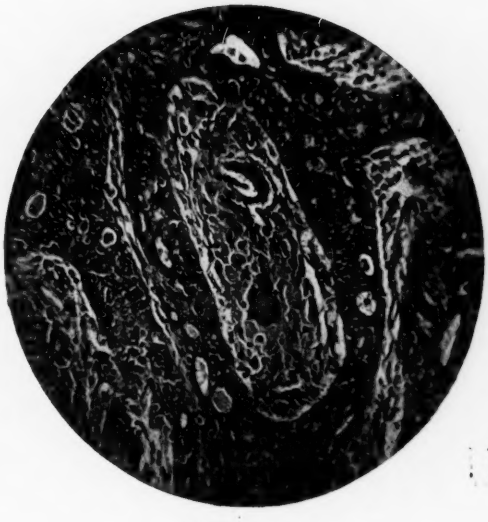

Fig. 4.

a hypertrophy of the papillary folds. These latter, instead of consisting of a simple core of connective-tissue covered with a single layer of columnar epithelium, are large expanded masses of connective-tissue containing numerous giant cell systems and tubercle nodules (Fig. 2). The epithelial covering has been lost in places, but in the midst of the connective-tissue large areas of it are present. It is in places arranged in the form of gland acini, and in others in solid strands and clumps. The simple acinous arrangement is more marked in the deeper parts next the muscular wall, the more solid and irregular arrangement in the centres of the projections and towards the tips. In this latter region also the tubercle nodules are more numerous and the necrotic process more marked. The muscular wall is in most places normal except for some degree of thickening. Only in a few areas is it invaded by tubercle nodules, and these areas closely abut on regions where such nodules are present in the deep part of the mucosa. The content of the tube is a clear homogenously staining material with a few cells in it next the mucous lining. On higher magnification it is seen that the acinus-like arrangement in the deep part of the mucosa next the muscular wall is due to the branching and hypertrophy of the villous processes and their section at different angles. The connective-tissue cores of these processes can be distinguished and the covering of a single layer of epithelium. At places this epithelium dips into the muscular wall more deeply than usual in the form of tubular prolongations (Fig. 3). The connective-tissue is more or less normal in appearance, except for a slight cellular increase, and in only a few areas is it invaded by the tubercle nodules. The epithelial covering is in a single layer and normal in appearance. On tracing these papillary folds outwards they expand into large masses of tissue, neighbouring processes apparently fusing with each other. Tubercle nodules with giant cell systems are very numerous, and between these are the epithelial masses already referred to (Fig. 4). So closely are these packed that there is practically no healthy tissue left between them. The tubercle nodules are of the ordinary type, consisting of the so-called epithelioid cell and giant-cell, and outside these collections of round cells with large nuclei. They vary greatly in size. Some of them are necrotic in the centre, and at the tips of some of the processes there is a distinct invasion with polymorpho-nuclear leucocytes indicating a mixed infection. In only one or two places can the nodule be seen breaking through the surface of the mucosa and discharging its content into the lumen.

The appearances of the epithelium are interesting. In the deeper parts next the muscular wall where it forms a unicellular layer covering the bases of the villous processes it is flatter than normal, and extends more deeply into the muscular coat, and cilia seem to be absent. Here and there a connective-tissue cell can be

seen making its way between the individual cells, but these are not frequent. At the tips of some of the processes in which there is no tuberculous invasion the epithelium is proliferating rapidly, forming several layers and being cast off into the lumen. In these processes the vessels are dilated, and there is active proliferation among the connective-tissue cells of the part. In one such villous process the epithelium is everywhere in this condition except at one point where it is degenerated and broken down, and at that area is a tubercle nodule extending into the connective-tissue core. From the surfaces of the fused processes which contain many tubercle nodules the epithelium has to a large extent disappeared, and it is in these that the masses of included epithelium are seen (Fig. 4). In the deeper parts next the muscularis it is arranged in an acinus-like way, the appearance being probably due to the cutting in different directions of much branched epithelium-covered processes and to the fusing of the tips of these processes, the bases remaining separate. Nearer the surface this acinous arrangement is lost, especially in those areas where the tubercle nodules are numerous. In these regions the epithelium forms strands and masses many cells thick, giving, on superficial examination, an appearance very like a carcinoma (Fig. 4). There is, however, no evidence of an active proliferation and invasion, rather the reverse, for everywhere it can be seen that these epithelial masses are being invaded by round cells with large nuclei which are making their way in between the individual cells and destroying them. Round each of these cells a clear space is usually visible, probably due to shrinking of protoplasm, and beyond that the remains of several epithelial cells arranged circularly, like a minute gland acinus. These are in turn invaded by other cells from the periphery, and so the masses of epithelium are broken up, degenerate and disappear. This process is most active towards the surface of the mucosa where the tuberculous process is most advanced.

Left Tube—More dilated outer portion. The muscular wall is thinner, and there are no tubercle nodules visible in it. The mucous membrane is thinner than in the less dilated portion, and the surface is more regular, the villous projections having almost entirely disappeared, owing to the breaking-down of their free extremities. Next the muscular wall there is a continuous covering of a single layer of columnar epithelium, and springing from this surface the bases of the villi can be distinguished still unfused, although the bodies of the processes nearer the lumen have fused together to form a solid mass of tissue (Fig. 5). In this latter is included epithelium, for the most part in a state of degeneration and much invaded by round cells. Between the epithelial masses are tubercle nodules and masses of tuberculous granulation tissue which is everywhere breaking down on the surface and being cast off into the lumen. The

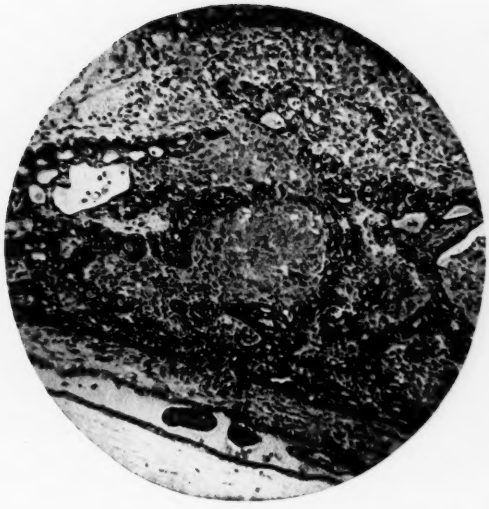

Fig. 5.

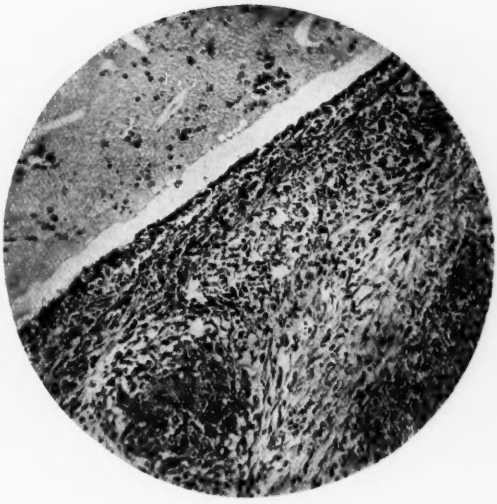

Fig. 6.

Fig. 7.

Fig. 8.

tuberculous tissue is evidently breaking down and disappearing, leaving next the muscularis a healthy layer of epithelium and a submucous coat as yet uninvaded by the tuberculous process (Fig. 5).

Right Tube—Greatly dilated outer part. In sections of this tube a still further stage of the process can be seen. The lining of the lumen is smooth and is covered with a single layer of epithelial cells. The connective-tissue is finely cellular, contains some extravasated blood, one or two tubercle nodules and some islands of included epithelium (Fig. 6). It has all the appearances except for the one or two isolated tubercle nodules of healthy granulation tissue.

Sections of the uterine wall fail to reveal any evidence of tubercle.

Case II. M. N., age 30, school teacher, nullipara, was admitted to Ward 35, Royal Infirmary, on March 14 1910. Eight or nine weeks previously she had noticed a swelling of abdomen, but had nothing else to complain of. No family history of tubercle except that one brother died of meningitis. Menstruation of four weeks' type, duration 4 days, slight dysmenorrhœa. No amenorrhœa. Has always had slight leucorrhœa. Occasional pain on micturition.

Patient is thin. A swelling is seen in abdomen reaching midway between pubes and umbilicus. It is semi-solid, is movable from side to side and vertically, and is dull on percussion. The cervix is small and nulliparous, and directed forwards. In the posterior fornix is a mass continuous with that felt through the abdomen. Through the right fornix a sulcus can be felt in the swelling, the part above being globular and seeming to move apart from the swelling below.

On opening the abdomen the left tube was found greatly enlarged. It extended from the left angle of the uterus towards the left, then turned on itself with a complete twist and, becoming greatly dilated, ran to the right across the pelvic inlet. It again turned on itself, became more dilated and ran towards the left side. The folds were adherent to each other and to the omentum and intestine. These were separated and the tube removed. It was then found that the right tube was in a similar condition lying low down in the pouch of Douglas and adherent. It was removed, and, as there was a large raw area left, the uterus was also removed. She made a good recovery, and was in good health some months later.

The specimen consists of both tubes and ovaries and the uterus (Fig. 7).

Both tubes are equally enlarged by dilatation of their ampullary and infundibular regions, measuring 13 inches in length and 10 inches in circumference. They are bent upon themselves, and numerous dense adhesions bind the folds together. The fimbriated extremities are occluded and are densely adherent to the ovaries, which are enlarged and cystic. Numerous adhesions are present

over the surface of the swellings, especially on the anterior aspect of the right tube. They are semi-fluctuating in consistence. On section of the uterine end the tube wall is thickened, but the lumen is not dilated. In the dilated portion in the ampullary and infundibular regions the content is muco-pus and the tube wall is thinned.

Microscopic Examination.

Less dilated part of Tube. The muscular wall is thinner than usual, but otherwise normal. The mucous membrane is enormously thickened by the swelling and fusing of the villous processes and by the invasion of these with tubercle nodules (Fig. 8). This invasion extends deeper down towards the muscular wall than in the preceding specimen, and the result is that the origins of the individual villous projections cannot be distinguished in many areas. In places these can, however, be made out, and in these areas many villi are quite unaffected, even at the tip. The included epithelium has more of the acinar arrangement than in the previous case, there not being so many clumps of epithelial cells present. This epithelium is being invaded and broken up by round cells, especially towards the free surface. Here also the tuberculous process is most advanced and numerous caseating areas are present.

In general features therefore the picture here is the same as that present in the less dilated portions of the tube in Case 1.

More dilated part of Tube. The muscular wall is thinned and the mucous membrane is greatly reduced in thickness as compared with that of the less dilated part. The mucosa has lost its villous projections except for an occasional one here and there. The included epithelium has in most places entirely disappeared except in the few villous processes still left where the acinar arrangement is seen. The tissue consists of breaking-down tubercle nodules and a great infiltration with small round cells and polymorphonuclear leucocytes. It is everywhere ulcerating and breaking down on the surface, the debris accumulating in the lumen (Fig. 9).

There is here again then evidence of a mixed infection with ulceration and breaking down of the thickened mucosa, and it presents an intermediate stage between the two areas described in Case 1 (Figs. 5 and 6).

Uterine end of Tube—Not dilated. The lumen is normal in size, and, as is usual in this part of the tube, the villous processes of the mucous membrane are few and small(Fig. 10). There is no invasion of the mucous membrane with tubercle, but there is some proliferation of the epithelial covering and of the connective-tissue, giving at places an acinus-like arrangement on section. The muscular wall is thick. The submucous and inner muscular layers contain numerous tubercle nodules studded all round the lumen, and in these areas

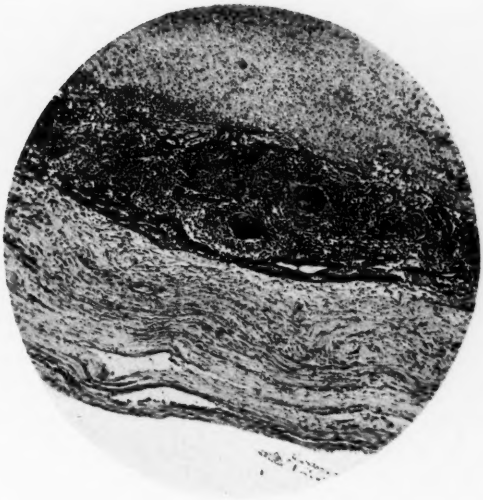

Fig. 9.

U of M

Fig 10.

Fig. 11.

Fig. 12.

deep in the tube wall are spaces like gland acini lined with columnar epithelium (Fig. 11).

Uterine Wall. In the mucous membrane near the tube angle one or two distinct tubercle nodules are present.

Case III. Mary M., age 27, single, nullipara. The patient was treated in Ward 35 seven years ago for a condition which on admission resembled a subacute appendicitis, but which later developed into what was described as a pelvic cellulitis on the right side. At this time there was a hardish swelling felt through the right fornix. She had irregular rises of temperature. The condition completely cleared up under treatment, and she left the ward apparently cured. Since that time she has been in good health until three months before admission, when she began to have a profuse yellow leucorrhœal discharge accompanied by inflammation of the external pudenda and pain on micturition. This was followed by severe abdominal pain which rendered her unfit for work, and she had been in bed for a fortnight before admission. One brother and one sister died of consumption. Menstruation is regular, of 28-day type, rather profuse in amount. Dysmenorrhœa of a pre-menstrual type has always been present.

On abdominal examination nothing is found. Per vaginam the cervix is nulliparous and looks downwards and backwards. The uterus is lying to the front, not enlarged and not tender. To the right of the uterus a swelling is felt coming close up to it. This swelling is fixed, somewhat tender, and semi-solid in consistence. It fills up the right and part of the posterior fornices. An exactly similar swelling is present on the left side.

On opening the abdomen it was found that the swellings were distended tubes, each about the size of a goose's egg. There were adhesions between each tube and ovary, but none to the intestine. The infundibulo-pelvic ligament on each side was clamped and the undilated isthmic part of the tube similarly dealt with. Both tubes and ovaries were then removed. There was no evidence of any peritoneal infection, and the abdomen was closed without drainage. The patient made a good recovery, and left the ward three weeks later. When seen a month afterwards, a small lump, about the size of a cherry, was felt in the situation of the right stump. The patient still complained of profuse leucorrhœa. Two months later she had put on a stone in weight, and was feeling very well.

The specimens consist of both tubes and ovaries, the former dilated into retort-shaped swellings measuring $7\frac{1}{2}$ inches in length and $7\frac{1}{2}$ inches in circumference.

The tubes are practically identical in appearance (Fig. 12). The isthmic portion is only slightly thickened, but just beyond it is a rounded swelling, the size of a cherry, growing from the upper

aspect. On section this swelling is found to be an abscess in the tube wall and excentric to the lumen. Beyond this the tube becomes gradually dilated, reaching its maximum size in the infundibular region. The fimbriated end is closed and adherent to the ovary which is large and cystic. There are numerous adhesions on the under aspect of the tube, but none on its upper aspect except at the isthmic portion. The consistence is fluid, and the content is thick greenish-yellow pus.

Microscopic Examination.

Inner end of Tube—Slightly dilated. The lumen is slightly dilated and the mucous membrane is hypertrophied. The folds of mucous membrane are thick and contain many tubercle nodules, and included epithelium, mostly in an acinar arrangement, but also in solid masses. The epithelium is absent on the surface of the projections. In the substance of them it is in most places undergoing degeneration and is being invaded by phagocytic cells. The tuberculous nodules extend into the inner muscular layer causing destruction of the muscle. In the vicinity of these areas of invasion the epithelium also dips deep into the muscle in the form of tubular prolongations. The tuberculous invasion is as marked in these regions as at the tips of the villous processes, the basal mucosa being in places entirely destroyed.

Dilated part of Tube. The muscular wall is thin. The mucous membrane has entirely disappeared, and in its place is a thin layer of granulation tissue with here and there included epithelium and giant cells.

Small dilated part near Uterine End. The dilatation is due to the presence of a tuberculous abscess in the tube wall. The lumen of the tube is intact and the mucosa is unaffected by tubercle. In the outer muscle coat an abscess has developed. It is lined with tuberculous granulation tissue, and in several areas there are calcareous deposits (Fig. 13).

Summary.

These three cases resemble each other closely in their clinical and pathological manifestations. In all there was an absence of symptoms pointing to any active or extensive tuberculous process proceeding in the abdomen or elsewhere. In two there was a history of tubercle in the family, but in neither case was this marked. In two, attention was directed to the condition by the appearance of an abdominal swelling, and in the third a leucorrhœal discharge possibly gonococcal in origin led to an examination of the pelvis and the detection of the swellings beside the uterus. In all three the condition was bilateral. The condition of the tubes in the first two is very similar—great dilatation of the ampulla and infundibulum

Fig 13.

and only slight thickening of the isthmus. In the third case the dilatation had not proceeded to the same extent, and in it the content of the tubes was more distinctly purulent than in the other two. In none of the cases was there any evidence of tubercle in the abdomen or elsewhere.

There is the same constancy in the microscopic appearances. In the less dilated parts of the tubes there is a great thickening of the mucous membrane produced by a hypertrophy and fusion of the folds as the result of the development in them of tubercle nodules (Figs. 2 and 8). The tubercle nodules are entirely confined to the mucous membrane, and are most abundant in the superficial parts of it. The bases of the folds and the muscularis are healthy. As the result of the irritation of the tuberculous poison there has been a hypertrophy of the epithelium resulting in a deeper penetration of it into the muscular layer and to the formation of strands and masses of it in the substance of the mucosa. The hypertrophy has been so great as to give to this part of the tube an appearance very like carcinoma (Fig. 4). Following on the overgrowth there has been a degeneration and destruction of the epithelium as the tuberculous process advanced. The masses have become broken up by the invasion of phagocytic cells, and all stages in the process of disintegration can be traced. The initial hypertrophy has resulted in an increased secretion and, apparently, in an alteration in the character of the secretion, so that the lumen of the tube and the spaces formed from the fusion of neighbouring processes have become filled with a mucoid material.

In the more dilated parts of the tube at the outer extremities the tuberculous process is more advanced. Ulceration has occurred causing a destruction of the superficial parts of the mucous membrane so that the villous projections are no longer visible (Figs. 5 and 9). The epithelium has almost completely degenerated except in the immediate vicinity of the muscular wall, and all that is left is a lining of tuberculous granulation tissue, while the cavity is filled with debris and muco-pus. There is evidence in parts of all the specimens that there is an acute inflammatory process also present pointing to a mixed infection.

In the most dilated part, namely, in the wall of the large pyosalpinx of Case i, a still further stage is seen—the stage of natural cure. The mucous membrane has been entirely cast off, leaving only a covering of a single layer of flattened epithelium, underneath which is healthy newly-forming tissue with only here and there an isolated tubercle nodule (Fig. 6). The muscular wall is healthy.

At the extreme uterine ends of the tubes a different picture is presented. The mucous membrane is free from tuberculous infection and shows only hyperplasia of the epithelial covering and a deeper extension into the muscular wall, resulting in the presence of gland-

like spaces lined by epithelium in the muscular wall at a considerable distance from the lumen (Figs. 10 and 11). In the muscular wall and submucous tissue are numerous tubercle nodules. In one of the specimens (Case iii) the tuberculous process in this situation has extended to such an extent as to lead to the formation of an abscess in the wall (Fig. 13).

It would thus appear that the tuberculous infection is most advanced in the outer dilated parts of the tubes, and is in that situation confined to the mucous membrane which is entirely destroyed by it. The muscle wall is not affected. In the less dilated part of the tube nearer the uterus the destruction of tissue is less marked, and the infection is still confined to the mucous membrane and is most advanced in the superficial parts of it. At the uterine end of the tube the mucous membrane is unaffected, but tubercle nodules are present in the tube wall. In Case ii tubercle nodules are also present in the mucosa of the uterus in the neighbourhood of the tube angle.

These are the facts. What deductions can we draw from them? Has the infection of the superficial parts of the mucous membrane in the outer region of the tube been a direct infection through the surface or has it come by the blood-stream? To this we can give no definite answer, but it seems to us that the appearances strongly suggest that it is a case of direct infection through the surface. When the physiology of the tube is considered this appears not unlikely. There must be, by the ciliary action in the healthy tube, a constant suction at its outer end which will draw into it any small bodies such as turbercle bacilli from the peritoneal cavity. In none of these cases was there any evidence of abdominal tuberculosis, but it is conceivable that the organisms were there in small numbers derived from some focus in the lungs or in mesenteric glands. Those that remained in the peritoneum may have been destroyed, for it is well known that the peritoneum can deal with small doses of tubercle bacilli. Only those which reached the interior of the tube may have continued to grow. It is probable that this method of infection of the tube from the peritoneal cavity takes place in other conditions, such as appendicitis, and it seems to us not unlikely that the same thing may happen in tubercle.

After the primary infection of the mucosa of the outer part of the tube there is evidently a lymphatic spread inwards towards the uterus, and that results in tuberculous deposits in the tube wall near the uterus, and in the uterus itself.

Another point of interest in these specimens is the reaction of the epithelium to the irritation of the tuberculous poison. It is first of all stimulated to overgrowth with deep extension into the tissues giving an appearance very like carcinoma. Later it undergoes destruction. It has been held by many writers that primary

carcinoma of the tube is secondary to chronic inflammation, and, looking at these sections, this appears possible. It is conceivable that an arrest of the tuberculous process before destruction of tissue occurred might leave the epithelium in such a state of activity as to take on a cancerous character. This reaction of the epithelium has been described by several writers in cases of tuberculous pyosalpinx and in other chronic inflammatory affections of the tube.

This epithelial overgrowth is also seen at the uterine end of the tube where the gland-like spaces are present in the muscular wall. This is an appearance which has been described as adenomyoma of the tube. It has been described by several writers in association with tubercle and by most, including von Franqué, it is regarded as secondary to it. With this we agree.

DESCRIPTION OF FIGURES.

Fig. 1. Double pyosalpinx removed along with the uterus (Case i). Note the size of the right tube as compared with that of the uterus.

Fig. 2. Section of slightly dilated inner part of left tube. The mucous membrane is greatly thickened and contains numerous tubercle nodules.

Fig. 3. High power view of Fig. 2 at junction of mucosa and muscular wall. The epithelium next the muscular coat is intact. Nearer the surface tubercle nodules are present and the epithelium is proliferating.

Fig. 4. Section of mucosa from slightly dilated part of left tube. The epithelium is forming solid masses and between them are tubercle nodules. The appearances are very like carcinoma, but on close examination it can be seen that the epithelium is being broken up by invasion by round cells.

Fig. 5. Section of mucosa and tube wall from more dilated outer part. There is a complete epithelial lining next the muscular wall which is healthy. Beyond this the mucosa is infiltrated with tubercule and is breaking down.

Fig. 6. Section of lining of outer dilated portion of right tube. The surface is smooth and covered with a single layer of flattened epithelium. In the connective tissue only isolated tubercle nodules. A process of cure.

Fig. 7. Double pyosalpinx (Case ii). Note the shape of the tubes and their size compared with that of the uterus.

Fig. 8. Inner slightly dilated part of tube. The mucosa is greatly thickened and contains numerous tubercle nodules. The epithelium is proliferated.

Fig. 9. Outer more dilated part of tube. The mucosa consists of a mass of breaking down tuberculous granulation tissue.

Fig 10. Isthmic end of tube. It is not dilated. There is no tubercle in the mucosa. The tube wall is greatly thickened and contains many tubercle nodules. Note the presence of epithelium-lined spaces in the wall—so-called adeno-myoma of tube.

Fig. 11. High power view of the gland-like spaces in the muscular wall. Note the tubercle nodule in relation to the space.

Fig. 12. Pyosalpinx (Case iii). The small rounded swelling in the region of the isthmus is a tuberculous abscess in the muscular wall.

Fig. 13. Section through the rounded swelling at the isthmus. The lumen of the tube is intact. The swelling is a tuberculous abscess in the tube wall. The dark areas are calcareous deposits.

SELECT CLINICAL REPORTS.

(Under this heading are recorded, singly or in groups, cases to which a special interest attaches either from their unusual character or from being, in a special sense, typical examples of their class).

Two Cases of Perithelioma.* (1) Of the Uterus, (2) Of the Tube.

By

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The tumour known by the name perithelioma has of late years been much discussed. It is so called because of the arrangement of the cells round the blood-vessels, the endothelial lining of which is intact. The cells composing the tumour are arranged outside this endothelial lining in a direction radial to the vessel. The cells are supposed to be derived from the perivascular lymphatics, and are therefore endothelial in origin, so that the tumour is really an endothelioma derived from the lymphatics.

To judge from the short descriptions in the latest text-books of pathology the tumour is not a common one in the female pelvic organs, and this is borne out by the few cases recorded in the literature. For this reason we wish to place on record the two cases which we have been fortunate enough to obtain.

Case I. *Perithelioma of the Uterus.* The patient was a married woman, aged 58, who had had three children. She was admitted to Ward 35, Royal Infirmary, Edinburgh, in October 1910. Up to five months before admission she had been quite well. Menstruation ceased when she was 48. In June 1910 she began to have a white vaginal discharge, at first small in amount, but rapidly increasing and becoming fœtid in odour. A month later it became blood-stained and the fœtor was not so marked. Just before admission it had become more watery, but was still occasionally blood-stained and

* Read before the Edinburgh Obstetrical Society.

Fig. 1.

Fig. 2.

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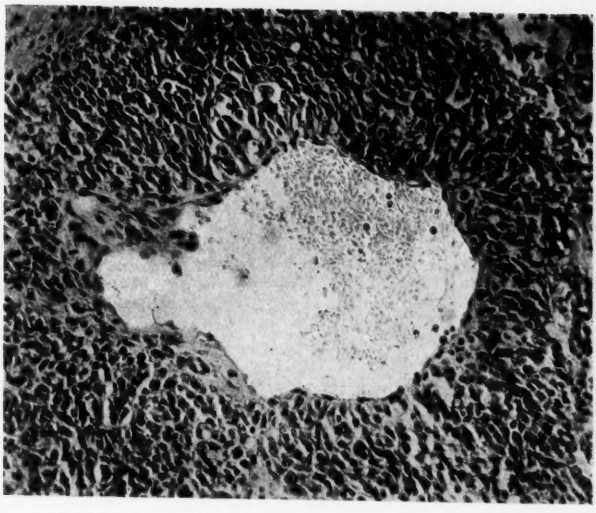

Fig. 3.

Fig. 4.

fœtid. A fortnight before admission she noticed a swelling in the lower part of the abdomen.

On examining the patient this swelling was visible as a small, rounded projection above the pubes and slightly to the right of the middle line. On vaginal examination the cervix was hard, not papulous, and slightly drawn up. Bimanually, the swelling was found to be incorporated with the uterus, forming a uniform swelling, about the size of a five months' pregnancy. It was of firm consistence and slightly tender. A diagnosis of fibroid tumour undergoing some degenerative change was made, and the abdomen was opened.

The uterus was found to be uniformly enlarged, free from adhesions and quite movable. It was removed by amputating low down through the cervix, and the operation was completed in the ordinary way. Recovery was uneventful, and so far the patient has remained well.

Specimen. The parts removed consist of the uterus together with the greater part of the cervix. It is enlarged to about the size of a five months' pregnancy, measuring six inches in vertical and four inches in transverse diameter, and is of a regular ovoid shape. The peritoneal covering is everywhere intact. The cervical canal admits the finger, and through it the lower pole of the tumour can be felt free inside the uterine cavity. At the line of amputation there is no trace of new growth.

On section after hardening in formalin the enlargement is seen to be due to the presence of a tumour growing from the fundus, the upper two-thirds of the anterior wall and upper one-third of posterior wall. The lower pole projects free into the dilated uterine cavity (Fig. 1). The section of the tumour is of a yellowish-white colour, resembling brain tissue in appearance and consistence. Throughout there are many hæmorrhages. These are largest and most numerous towards the fundus, and in this region there is an area of necrosis where the tissue is breaking down. The appearances are thus very like those of an ordinary sarcoma.

Over the area of the uterine wall from which the growth is springing there is extensive invasion of the tumour, so that at the fundus the muscular wall is reduced to a mere shell. The extent of the invasion diminishes towards the lower pole of attachment. The mucous membrane and muscular coat beyond the site of the tumour are to all appearances healthy.

Microscopic Examination. The great part of the tumour, especially towards the centre, is composed of necrotic tissue containing extravasated breaking-down blood, but otherwise devoid of definite structure. Towards the uterine wall islands of tumour cells are present in the midst of this necrotic material. Each island consists of a blood-vessel, the endothelial coat of which is intact, but

the other coats are replaced by radially arranged cells (Fig. 2). The cells are of somewhat irregular outline; each contains a large, deeply-staining nucleus, and most are set at right angles to the lumen of the vessel (Fig. 3). The cells at the periphery of the area are in various stages of degeneration. These appearances are constant throughout the growth, the vessels in some cases being cut longitudinally and in others transversely. In some parts there are appearances suggestive of the origin of these cells from the lymph channels, small spaces being visible with the cells grouped round them. Sections of the uterine wall at the site of the tumour show the tumour cells invading the muscular coat. Here the perivascular arrangement of the cells is not so distinct.

Case II. *Perithelioma of the Fallopian Tube.* The patient was an unmarried multiparous women, aged 53. Previous health had been quite good. Menstruation ceased at the age of 51. Seven months prior to admission she had noticed a swelling in the lower part of the abdomen towards the left side, her attention having been drawn to it by pain in that region. An irregular vaginal discharge then made its appearance. It was sometimes pure blood, sometimes a yellow pus-like discharge, but most often yellowish and streaked with blood. The abdominal swelling increased in size and the general health began to deteriorate.

On admission to hospital the patient was emaciated. The abdomen was tumid, and there was a marked projection extending as high as the umbilicus and slightly to the left of the middle line. This swelling was hard and almost filled up the left iliac fossa. On vaginal and bimanual examination it could not be differentiated from the uterus. The lower pole was felt through the anterior and left lateral fornices and a nodule through the right fornix.

On opening the abdomen a considerable quantity of free fluid was evacuated. The peritoneum and intestines were studded with nodules evidently malignant in character. The left Fallopian tube was much enlarged, and formed the swelling in the left side of the abdomen. It was hard and nodular and adherent to the intestines and to the ovary, which was also covered with secondary nodules. On the right side the ovary was the seat of a small cystic tumour, about the size of a fœtal head. It also was covered with nodular growths. The tubes and ovaries on both sides were removed, but it was impossible to deal with the secondary deposits.

After the operation the patient had a great deal of sickness, and she died eleven days after operation. Unfortunately no post mortem examination could be made.

Specimen. The specimen consists of the left tube and ovary. The tube is enlarged towards its ampullary and infundibular regions. The uterine end is of normal size, and on transverse section its lumen

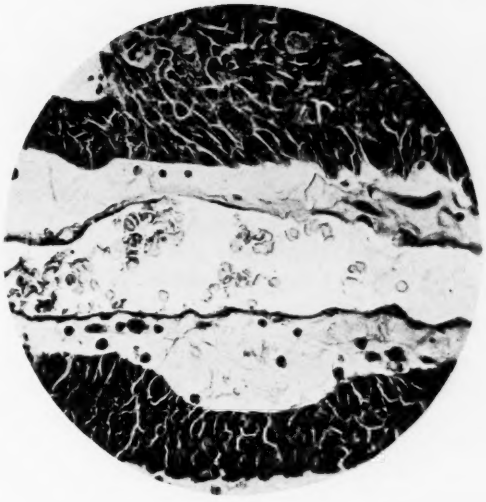

Fig. 5.

is not dilated. Beyond the isthmus it rapidly expands, the lumen in this region being dilated and filled with mucus which has coagulated with the formalin. Beyond this dilated portion the tube forms a solid tumour mass which retains a convoluted shape, but in which the fimbriated extremity cannot be distinguished. The whole mass measures four inches in length and seven inches in circumference.

In the peritoneum on the surface are numerous dilated veins and several small nodules. Towards the outer extremity there is a fungating part of the growth which has broken through the peritoneal surface. On section of this part of the tube all trace of lumen is lost. The cut surface is of a yellowish-white colour and of brain-like consistence and appearance. In it are several hæmorrhagic areas, and in places the tissue is softened and broken down.

The ovary is slightly enlarged and is covered with small nodules, which on section have the same appearance as the growth in the tube.

The ovarian tumour from the right side has the ordinary characters of a cyst-adenoma, but on the surface are many small secondary nodules apparently implanted there.

So far as examination of the parts removed can show the primary growth seems to be in the tube, but it is impossible to be absolutely definite on this point as, in the absence of a post mortem examination, the presence of a tumour elsewhere in the peritoneal cavity cannot be excluded. There was, however, no evidence of such at the time of operation.

Microscopic Examination. Sections of the isthmus of the tube show no disease, nor do those taken from the dilated portion immediately beyond this. In this region there are, however, secondary nodules of growth on the peritoneal surface. In the outer part of the tube, which has been converted into a solid mass, the typical structure is seen. The great part of this growth is made up of malignant cells, and in most of the areas examined the perivascular arrangement of these cells is evident, with areas of necrosis and hæmorrhage interspersed (Fig. 4). The appearance of the vessels differs from that described in the perithelioma of the uterus. The endothelial lining of the vessels is intact, and outside it is a clear zone of material which stains homogeneously and only very feebly, resembling hyaline. Beyond this hyaline zone the tumour cells are arranged radially to the vessel lumen. The cells are large and irregular in outline with central, darkly-staining nucleus (Fig. 5). In parts the cells are seen in solid clumps with no vessel in the centre, but this is probably in most cases due to the direction of section. In the secondary deposits on the surface of tube, ovary and the right-sided ovarian cyst the perivascular arrangement of the cells is not seen. They are solid masses, but have the same characters as those forming the tubal tumour.

Of these two cases the tubal tumour is evidently the more

malignant in character. A study of the literature shows that the degree of malignancy varies greatly in different cases, many apparently being on the border line between innocence and malignancy. Lately there has been a tendency to regard peritheliomas as ordinary carcinomas or sarcomas with necrosis and persistence of the tumour cells in the region of the vessels. Roussy and Ameville (*Bull. de l'Assoc. Franc. pour l'Etude du Cancer*, Tome iv, No. 3) rather support this view, and that after a careful study of many specimens and all the literature. To this paper the reader is referred for the full discussion of the question. In his recent paper on "Tumours of the Uterus," Leith (*Jour. of Obstet. and Gynæcol. of the Brit. Emp.*, April and May 1911) describes specimens of sarcoma with this perivascular arrangement of the cells, and discusses their possible origin from the endothelium of the vessels. Mention may also be made of the cases of perithelioma of the uterus described by Doran and Lockyer in this JOURNAL in 1908.

DESCRIPTION OF FIGURES.

Fig. 1. Perithelioma of uterus. Note the wide origin from the uterine wall and the thinning of the wall by invasion of the growth. Most of the tumour is necrotic.

Fig. 2. Typical appearance of tumour. Large areas of necrosis with islands of active growth, each consisting of a vessel surrounded by cells.

Fig. 3. High power view of vessel and perivascular growth.

Fig. 4. Perithelioma of tube. Note the perivascular arrangement of the cells and the hyaline zone between them and the endothelial lining.

Fig. 5. High power view of vessel and tumour cells. Note the normal endothelial lining, the clear zone, and outside it the tumour cells.

Cervical Polypi Exhibiting Decidual Changes.*

By James Haig Ferguson, M.D., F.R.C.S., F.R.C.P., and James Young, M.D., F.R.C.S.

The following case is of double interest. In the first place, it concerns a patient from whom comparatively large cervical polypi were removed at the third month of pregnancy; and, in the second place, it is of interest from the fact that the cervical tissue entering into the structure of the polypi had undergone a decidual change. The clinical particulars are as follows:—

The patient was 49 years old. There was a miscarriage 10 or 11 years ago at the second or third month. She had borne two full-time children—9 years and 7 years ago. In the menstrual history there is nothing to note.

From October 2 to 6, 1910, she had an attack simulating, according to the doctor in attendance, subacute appendicitis. This passed off with rest, dieting, enemata and hot fomentations. Late in November of the same year there was severe constipation. This led to a vaginal examination, when the uterus was found to be retroverted. It was replaced, and a Hodge pessary was inserted. At this time there was no evidence of anything abnormal projecting from the cervix.

For a fortnight or so she expressed herself as feeling practically well. She then, according to her doctor, "began to develop the signs and symptoms which have always accompanied her pregnancies: constant nausea, great thirst, marked constipation and a tendency to the blocked nasal passages always noticeable when she was pregnant." The last menstruation was at the beginning of November.

Early in February she complained of a slight bloody discharge, which continued for two days. On examination two soft polypoidal masses, together about the size of the little finger, were found projecting from the external os. These were removed by Dr. Haig Ferguson on the 12th of February. At the time all the signs of pregnancy between the third and fourth month were noted.

On the 10th August 1911 the patient was safely delivered of a full-time child. The placenta was normal.

Pathological Examination. Two different parts of the polypoidal mass were examined. They were found to possess characters somewhat resembling those presented by the ordinary polypi which develop from the glandular mucous membrane of the cervix (Fig. 1).

* Communicated to the Edinburgh Obstetrical Society, July, 1911.

The main mass of the polypi consists of an œdematous stroma composed of a connective-tissue of a low or embryonic type (*i.e.*, there is little attempt at differentiation). Imbedded in this there are glands lined with the single layer of palisade epithelium characteristically present in the racemose glands of the lining of the cervical canal.

There are some points of especial interest in connection with the *connective-tissue stroma*. As mentioned, it presents little differentiation of structure, the cells unite freely with one another, and there is an absence of the distinct fibrous appearance present in the mucosa of the normal cervix. The conditions suggest a young, newly-formed tissue, and, in many respects, coincide with those seen in the stroma of the corporeal mucosa (Fig. 2).

Cause of the œdema and blood escape. There is a marked œdematous collection throughout the entire connective-tissue. The vessels are, in many places, distended, and in some regions there are areas of hæmorrhage, some of which are large. In addition there are small areas which stain deeply with eosin and in which the nuclei are disintegrating or have actually disappeared. These areas are scattered throughout the tissue and correspond to commencing necrosis, doubtless dependent on a local interference with the blood-supply of the polypi.

On careful examination it is found that the watery escape into the tissues is associated with changes of considerable importance. It is found that, in the process, the cells have been spread apart, and the appearances would at first sight suggest that there has been mechanical expansion of the intercellular spaces dependent on a fluid escape in response to an increase in the intravascular tension.

On examination under a high-power lens it is found, on the other hand, that the appearances all prove that *we are dealing with a protoplasmic change that has resulted in an imbibition of fluid.* We can make out that the intercellular spaces correspond to completely closed-in fluid spaces, and throughout we can see dropsical accumulations in the protoplasm which has become swollen and split up into fluid chambers separated by fine cytoplasmic films (Fig. 2). The appearances are amenable only to the explanation given above.

The changes just noted in these polypi have been described in full by one of us as a constant alteration in the uterine mucosa in menstruation and in early pregnancy, in both of which conditions we have a diffuse protoplasmic change tending to lead to an imbibition or dragging of the blood from the vessels. It is changes of this kind that are responsible for the alterations in the endometrium by which the early ovum is furnished with its blood supply.* Space

* Young. "The Uterine Mucosa in Menstruation and Pregnancy; the Action of the Chorionic Cells and the Function of the Decidua."—Proc. Royal Soc. Med., June, 1911. Young. "Reproduction in the Human Female."—Messrs. William Green and Sons, Edin. and Lond., 1911.

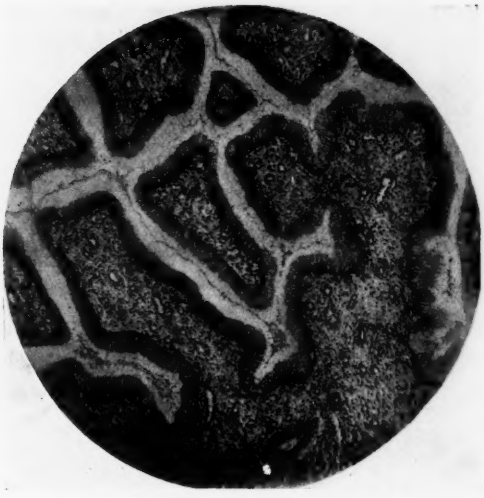

FIG. 1. *Cervical polypus.* Section from surface showing characteristic cervical epithelium and the papillomatous arrangement present.

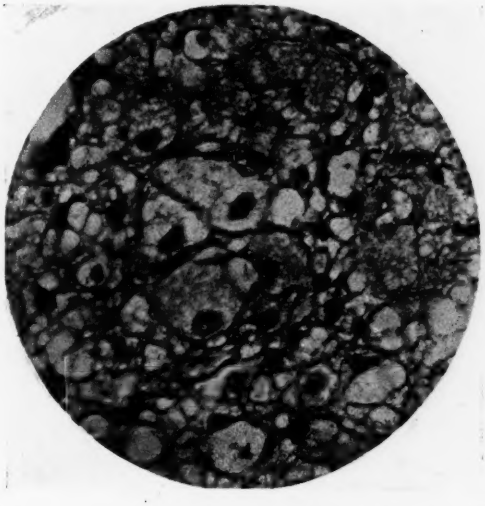

FIG. 2. *Cervical polypus.* Connective-tissue showing decidual change and alterations associated with an œdematous "escape." Note the froth-like appearance and the so-called "network," which really consists of the *films* of displaced protoplasm.

will not permit a fuller account of the significance of these tissue changes.

Decidual Change in Stroma. In places the stroma cells are enlarged in a truly decidual fashion (Fig. 2). They may be lying singly, in small groups or in dense masses resembling in every respect the appearances present in the decidua compacta of normal pregnancy. This change is of especial interest as it is occurring in this specimen in tissue derived from the stroma of the cervical mucosa, in which a decidual alteration is usually said to be absent during pregnancy. We believe that it is possible to explain both of these changes, the ease with which the œdema has taken place and the decidual alteration in cervical tissue, as due to the fact that we are dealing with young, newly-formed tissue exhibiting characters which identifies it closely with the endometrial stroma, in which the changes readily occur during pregnancy in response to the materials elaborated by the chorionic cells.

The microscopic appearances suggest that the polypi are of recent growth. From the history it will be noted that there was no evidence of their existence early in pregnancy, and, whilst it is impossible to say that they had developed *de novo* during the pregnancy, there is every reason for the belief that the pregnancy had at any rate stimulated their growth.

The Glands and the Epithelium. As we have described above, the epithelium of the gland spaces and on the surface is of the cervical type. The glands are clearly undergoing an increase in their numbers, and in places are distended in a cyst-like fashion, the cavity being occupied with a homogeneous faintly-staining secretion. There is, however, an absence of the marked glandular increase associated with the typical cervical polypus. Another point of interest is found in the fact that the surface of the tumours has in places assumed a definite papillomatous change. In Fig. 1 is seen a section through the surface level which has cut across the outwardly projecting stalks, consisting of stroma core covered by epithelium.

Simple Papillomata removed from Vaginal Vault after Vaginal Hysterectomy for Cervical Cancer.*

By James Haig Ferguson, M.D., F.R.C.S., F.R.C.P., and James Young, M.D., F.R.C.S.

The following are the notes of a patient under treatment in Ward 36, Royal Infirmary, Edinburgh:—

Mrs. S., æt. 47; she had 7 children, the youngest being 6 years old. On March 27 1911 a vaginal hysterectomy for squamous epithelioma of the cervix was carried out by Dr. Haig Ferguson. At the time it was doubtful whether all the disease had been removed. On April 24 1911 two soft, bleeding projections were removed from the vaginal wall at the site of the wound in the vault which was completely healed.

The pathological report of these outgrowths is of considerable interest. Microscopic examination revealed in them characters somewhat similar to those found in a villous papilloma.

At no part was there any evidence of the ordinary squamous epithelium of the vagina. The connective-tissue is markedly œdematous, and in places is infiltrated with blood. Many of the vessels are greatly expanded. In places there are large tracts of degeneration. The surface is in parts devoid of an epithelial covering. In most places, however, this is present and consists of an epithelial layer of flat or cubical cells arranged in a single row. In other regions the cells are several layers deep.

The surface of the growths exhibits appearances of great interest in the existence of distinct villous outgrowths of the connective-tissue covered by epithelium. The connective-tissue cores are œdematous and in places hæmorrhagic. There is in parts great distension of the vessels. In some places they are disintegrating in a manner similar to the change encountered in the main mass of the growth. The epithelium is one, two or more layers deep. In places it is absent.

The projections vary greatly in appearance and size. Sometimes they are broad, at other times they are long and filamentous. After arising by a broad stalk they may break up into fine processes. They are often seen to branch. These appearances are shown in Fig. 1. In some regions the epithelial increase is associated with a projection of epithelium-lined spaces into the superficial parts of the main growth.

* Communicated to the Edinburgh Obstetrical Society, July, 1911.

FIG. 1. *Papilloma from Vaginal Wall.* Note the villous stalks covered by epithelium. In places the vascular distension is seen.

The appearances, which have just been described, are somewhat puzzling. It is difficult to give an explanation of the exact origin of the papillomatous growth in this unusual situation. At first sight it might seem that one was dealing with the epithelial lining of the tube, which had been cut across, and the divided end of which was pouting into the vaginal vault. The situation in relation to the scar might be supposed to lend support to this conception. There is no evidence, however, of a lumen in the outgrowths and the arrangement of the epithelium is such as to negative such a simple explanation. In the first place, the epithelium-covered processes develop over the surface of the growths in a very irregular fashion. Some parts are flat, whereas others are beset with an intricate system of villous growths. In the second place, where the outgrowths occur they do not correspond to the simple arrangement of the mucous folds such as is found in the inner portion of the tube, *i.e.*, the end with which one would be dealing as the tube is cut across close to the lateral margin of the uterus. On the other hand, it may possibly be the case that in the outgrowth we see an actual new formation derived from the tubal mucosa, which has assumed a papillomatous state. As has been noted, however, the epithelium which covers the surface of the main growths and the villous projections is different from that found in the tubal mucosa. Instead of being columnar and ciliated it is, for the most part, flattened or cubical. This, however, may simply represent an incidental alteration.

The other explanation which may be advanced is that the papillomata are derived from the vaginal mucosa, though, as has been mentioned, there is at no part of the growths any trace of the squamous epithelium of the vagina.

On the whole, it would seem that we are dealing with papillomata, simple in nature, derived from a local overgrowth of the mucosa of the inner ends of the tubes, where they have been cut across in the process of detachment of the uterus.

The practical point brought out by this case is that bleeding after a vaginal hysterectomy may occur even after a complete healing of the vaginal vault as the result of a constant oozing from such structures. We have referred to the congestion, œdema and hæmorrhage exhibited by them.

CRITICAL REVIEW.

Exophthalmic Goitre and Pregnancy, Labour and the Puerperium.

By Clifford White, M.D.,
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At the present time it is difficult to obtain any definite information on this subject, the statements in the standard text-books and monographs are meagre and frequently contradictory. An attempt is therefore made here to collect a few of the statements that have been made on the subject to enable conclusions to be drawn.

There would appear to be no sharp line of demarcation between a simple and an exophthalmic goitre (Graves' disease); the symptoms of the latter may appear when a patient has had a simple goitre for years, or exophthalmic symptoms may be present with little obvious thyroid change.

The subject falls into three divisions—(1) the influence of child-bearing on the goitre; (2) the influence of goitre on child-bearing; (3) the condition of the child born of exophthalmic mothers.

The influence of Child-bearing on Exophthalmic Goitre. All writers seem to agree that swelling of the thyroid is common during pregnancy, and that the swelling may persist after delivery. Aetius,[1] in 1567, suggested that a bronchocele was caused by straining, and gave parturition as an example. Guillemeau,[1] in 1612, noted the connection between goitre and pregnancy. More recently an attempt has been made to correlate the thyroid enlargement with the efforts of the patient to combat the toxæmia of pregnancy. Nicholson [2] strongly holds this view, and Lange [3] found that only 25 out of 133 women examined during the last three months of pregnancy had *not* got hypertrophied thyroids, and of these 25 no less than 18 had severe albuminuria. There is, however, evidence that symptoms of the toxæmia of pregnancy are common with Graves' disease.

Taking now cases with the classical symptoms of Graves' disease, one finds that Whitridge Williams [4] is almost alone in stating that pregnancy plays no part in the production of Graves' disease; most other standard text-books make opposite statements; for example, Hirst [5] says that it may originate during pregnancy, but will usually

disappear after delivery. He mentions a case where the disease recurred in three successive pregnancies—the patient being well at other times. Edgar states that a small minority are improved, but a great majority made worse; it may appear in the *puerperium* of successive pregnancies. Garrigues [7] agrees that patients get worse during pregnancy. Wilson [8] saw a patient where exophthalmic goitre appeared in the third pregnancy.

Halliday Croom criticises Bucquet's [9] article, and excludes many of his cases, but accepts the fact that in two cases the pregnancy added exophthalmic symptoms to a pre-existing simple goitre. Croom's [10] own twelve private cases were all made temporarily worse by the labour. Jouin [11] states that Graves' disease has intimate relation with pathological conditions of the pelvic organs, and quotes 43 cases (mostly gynæcological). Many of his cases appear to have been very slight ones, and hardly worth the name of exophthalmic goitre. Doleris [12] disagrees with Jouin, and thinks that fully-developed Graves' disease is, on the whole, rare in patients with pelvic lesions. Freund [13] had a patient who had a simple goitre in her first pregnancy, which disappeared five weeks after labour; in the third pregnancy Graves' disease appeared, but all symptoms, except slight tachycardia, had gone three days after delivery. This disappearance of symptoms is much more rapid than in other recorded cases. Mackenzie [14] states that in several instances he has seen great improvement or even recovery result from pregnancy.

Dr. Harold Pretty gives me details of a case remarkable on account of the severity of the Graves' disease. The first symptoms occurred in 1907, two months after marriage, and rapidly increased to an alarming extent, the vomiting being especially marked. Improvement took place till 1908, when she became pregnant for the first time; within three months the patient was desperately ill with acute Graves' disease, but the symptoms lessened during the ensuing six weeks, and she was delivered at full term of a normal child. The labour was normal, and the child has remained healthy. The improvement was maintained till 1910, when a second pregnancy occurred, and again the patient was in grave danger from vomiting and general exophthalmic symptoms. Improvement occurred when the pregnancy had gone to four and a half months, and two months later she was able to leave her bed. A normal premature labour occurred. The fœtus was normal. Puerperium uneventful.

I have recently seen two cases where the symptoms rapidly increased during early pregnancy, but subsided before delivery. In both cases labour was uneventful (forceps used in one case owing to cyanosis). No excessive post partum hæmorrhage took place. In one case the child was normal. The other child showed abnormalities, which I hope to describe subsequently.

Several cases have been published where symptoms of Graves'

disease have accompanied the ordinary symptoms of the toxæmia of pregnancy. This is at first sight all against Nicholson's work on the toxæmia of pregnancy being due to deficient thyroid activity, as exophthalmic goitre is usually regarded as due to over-activity of the gland, and all the classical symptoms can be produced by an overdose of the gland substance by the mouth in dogs and monkeys. But it must be remembered that myxœdema fairly frequently accompanies or terminates Graves' disease, and myxœdema is certainly due to a deficiency of the thyroid secretion. It is only necessary just to mention that the most recent research points to the parathyroid glands, and not the thyroid, being of paramount importance in these conditions.

As examples of the onset or increase of exophthalmic goitre with the toxœmia of pregnancy may be quoted Audebert's [15] case—a patient with œdema and signs of toxæmia who developed Graves' disease when seven months pregnant. The toxæmia increased, and she was comatose when delivered. By four months later gradual improvement of the Graves' disease had occurred. He quotes many other toxic states (*e.g.*, syphilis and typhoid fever), which have been credited with the causation of Graves' disease. Stowe [16] gives details of a patient with Graves' disease of some two years' standing, who became pregnant on October 8 1907. Incessant vomiting occurred, and the exophthalmic symptoms became very severe. The urine contained 2 per cent. albumen, no sugar. The uterus was emptied on December 28th under ether anæsthesia, but the patient died six days later. One of Halliday Croom's cases died of eclampsia. Skutsch [17] had a patient who had exophthalmic symptoms during her first pregnancy; the second and third were normal, but severe symptoms of exophthalmic goitre appeared in the fourth. Labour was induced and dead twins delivered, but the patient died in coma soon after. The changes in the liver in cases of the toxæmia of pregnancy are well known, and Pottet and Kervilly [18] have described changes in the thyroid in cases of eclampsia; it must be added that microscopic alterations in the thyroid have been described in many subacute hepatic diseases.[19]

The influence of Exophthalmic Goitre on Child-bearing. There can be little doubt that Graves' disease strongly predisposes to sterility, for, although the disease typically occurs at the very age when pregnancy is most common, yet pregnancy in patients with pre-existing Graves' disease is rare. Halliday Croom knew of only one patient with a goitre among 15,000 cases in the Edinburgh Maternity Hospital, and this patient does not seem to have had exophthalmos. Martin [20] saw no example among the patients that he examined. The Queen Charlotte's Hospital Reports for 1907–8–9 mention no case.

This sterility may be due to the fact that the uterus and ovaries tend to atrophy, and that amenorrhœa is frequently present.[21] The

breasts may also atrophy, and so may the labia majora and mons veneris.[22] Cheadle,[23] in 1878, had noted this. The atrophy may be quite rapid, as Hodemaker [24] recorded a case in a girl of 29 with exophthalmic goitre of only two years' standing.

This atrophy does not necessarily cause absolute sterility, as Theilhaber [25] gives an example of a patient who became pregnant after long-standing amenorrhœa. The influence of Graves' disease on menstruation seems very variable. Russell Reynolds [26] found menstruation normal in 46 out of 49 patients. If the patient becomes pregnant ante-partum hæmorrhage is said to be frequent, Lawson Tait [27] being quoted as the authority. Many of the recorded cases have ended in abortion or premature labour, but an important point which a study of the labours of these patients brings out is the frequency of post partum hæmorrhage. Halliday Croom had 12 cases of labour, with Graves' disease, in private practice; eight were normal. Of the other four, one had severe post partum hæmorrhage, and super-involution followed; the second had accidental hæmorrhage; the third miscarried at the third month, post partum hæmorrhage was very severe and super-involution followed; the four had a normal labour, but died of post partum eclampsia. Mackenzie's patients had post partum hæmorrhage. Nicholson [28] attended two cases; hæmorrhage was severe in both. He also noted that the secretion of milk was unusually free; in this connection it may be added that thyroid given to a lactating woman is said to increase the flow of milk;[29] but in opposition to this normal lactation may occur after total thyroidectomy. Bang [30] states that the active principle is excreted by the milk.

Mossé and Cathala [31] report an interesting case where a marasmic goitrous child improved rapidly when thyroid was administered to its wet nurse. Bramwell [32] noted symptoms of hyperthyroidism in a child each time that thyroid extract was given to its mother, who was suffering from Graves' disease which had come on during the pregnancy. In Audebert's case (*loc. cit.*), which was breast-fed, there is no mention of the child being affected. In one case recently under observation I was unable to notice any increase in the pulse-rate in a normal child which was fed on the milk from an exophthalmic mother for over 24 hours.

The condition of the Fœtus born of Exophthalmic Mothers. The state of the fœtus, and especially the condition of its thyroid gland, has been usually omitted from the published description of cases. This may be due to some doubt as to what is the normal condition of the thyroid in the fœtus. As a rule it does not seem to be functional at birth. Berry [33] states that it is almost solid and contains little colloid. Ballantyne [34] points out that it cannot contain iodine, but after the third month of intrauterine life thyromucoin is present; the reappearance of this substance in adult life

has been regarded as a cause of exophthalmic goitre.[35] Ballantyne quotes Svehla,[36] who states that the fœtal thyroid does not contain any substance to accelerate the pulse. The former suggests that if the maternal thyroid is deficient the fœtal gland may assume its post-natal function.

Ochsner and Thompson [37] state that the hyperplasia produced by a partial thyroidectomy may be reduced to colloid by giving iodine. It would thus appear that one of the essential differences between the fœtal and adult thyroid is the presence of iodine in the latter. That the maternal gland has some influence on the fœtus *in utero* is proved by the experiment of Edmunds,[38] who removed the whole thyroid and one parathyroid from a pregnant bitch. Four months later it gave birth to a puppy with a hypertrophied thyroid with absence of colloid. Edmunds was confirming Halstead's work. Graves' disease (hereditary or otherwise) is extremely rare in infancy. Berry (*loc. cit.*, p. 176) says it is "almost, if not quite, unknown before the age of two and a half years." Ochsner and Thompson show a photograph of a five months old child with Graves' disease. The disease was present five weeks after birth. It was the fourth child and was a month premature. The mother herself suffered from Graves' disease, which had come on during her first pregnancy. Reference is given to another case in infancy by Loddo.[40]

T. Graves, in 1910, showed at a Laboratory Meeting of the Pathological Section of the Royal Society of Medicine, a litter of six bull-terriers, all of which had all the classical symptoms of exophthalmic goitre well marked at four weeks old, when he first examined them. The mother was a normal bitch.

Many cases are on record of the disease appearing about the age of puberty in several members of the same family. Rosenberg [41] saw it in one sister, father, two paternal aunts and the paternal grandmother of a patient; and Mackenzie [42] mentions a hysterical mother of ten children, where eight out of the ten had exophthalmic goitre in varying degrees, and one daughter had four grandchildren affected.

Regarding the after-histories of the children born of mothers with exophthalmic goitre little is recorded. Church [43] delivered an exophthalmic mother of twins; one died, the other was an epileptic when 15 years of age (there was a family history of epilepsy). Dr. F. J. Poynton gives me details of a rare case recently under his observation. A girl developed Graves' disease at 18, with much exophthalmos and thyroid enlargement. She married at 25; a year later a child was born. At this time the mother's symptoms were well marked, but they improved after delivery except some tachycardia which persisted. The child, when four months old, was a typical cretin. She improved under thyroid medication, and is now a healthy child of five years. In Pretty's case, as mentioned above, the infant is quite healthy after 2½ years.

Conclusions. The results published are so contradictory that doubts are raised whether true Graves' disease has been present in all cases. Where Graves' disease was undoubtedly present it would appear that sterility is common. If pregnancy takes place premature labour and ante-partum hæmorrhage occasionally occur. Severe post partum hæmorrhage has been sufficiently frequent to make it an important complication. Super-involution with amenorrhœa certainly takes place, but only in a small proportion of cases, as repeated pregnancies are frequently seen.

Regarding the connection between Graves' disease and the toxæmia of pregnancy, it is necessary to note how nearly all the symptoms and signs of toxæmia may be present in an exophthalmic patient who is not pregnant. Œdema, for instance, is not infrequent, and usually affects the feet and eyelids. Vomiting unrelated to the ingestion of food is common and may become a grave symptom; even epigastric pain is sometimes present, and diacetic acid and acetone have been found in the urine. Albuminuria does occur, but is somewhat rare. Relapses and recurrent attacks of Graves' disease have been described comparable to the cases mentioned where a patient only suffers during her pregnancy or puerperium. It would thus appear that the normal symptoms of exophthalmic goitre (frequently made worse by the occurrence of gestation) have been mistaken for the toxæmia of pregnancy, but no true relation of the two conditions has been proved to exist. Treatment in these cases should be directed towards the exophthalmic goitre and not towards a hypothetical toxæmia.

Pregnancy is an important factor in the ætiology of the disease, and on the whole makes it worse. The patients may pull up lost ground towards the end of the pregnancy, but are again made worse by the labour in a good many instances. Improvement during the puerperium is usual and occasionally even a cure may take place. Relapses during subsequent pregnancies are to be expected.

The risks to the mother are not so great as to contra-indicate marriage.

The fœtus is usually normal and healthy; abnormalities present at birth are probably coincidences. The amount of evidence obtainable regarding the effect of lactation is too small to draw conclusions from, but no proof has been given that breast-feeding is dangerous to the child.

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REVIEWS OF CURRENT LITERATURE.

UNDER CHARGE OF EARDLEY HOLLAND, M.D.

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An Investigation on the Use of Iodine in Skin Sterilization for Surgical Purposes.

J. WESLEY BOVÉE (*Amer. Journ. Obstetrics*, July, 1911) in an interesting article on this subject gives tabulated results of experiments of skin disinfection with tincture of iodine in various strengths, and states that these results convince him that dilutions of less than 50 per cent. of the tincture should not be relied on for fields with coarse hair follicles, such as the genitals, the scalp, and axilla, but that, as a routine agent a 50 per cent. solution would be best, two coats being applied two and four minutes before the beginning of the operation and a third coat to the wound and adjacent surface directly after the operation is completed. The milder dilutions, forty and thirty per cent., may be used about wounds at redressing before complete healing of the skin has occurred.

He gives the following as a resumé of the experiments undertaken :—So far as can be ascertained by culturing epidermic scrapings, weak dilutions of iodine, even to 5 per cent. of the official tincture, thoroughly sterilize the surface of the skin after a period of time from two minutes to fifteen minutes from its application. These cultures incubated three days have not shewn any colonies. Beyond that period of time investigations with this dilution of iodine in skin sterilization have not been made. While the inhibitive action of absolute alcohol is quite potent, this property is greatly enhanced by the addition of iodine to an equivalent of 5 per cent. of the U.S.P. tincture.

Pubic hair placed in iodine dilutions of 5, 10, 20, and 40 per cent. strength (of the official tincture), respectively for two, three, five, eight, ten, twelve and fifteen minutes respectively, all showed growths after three days' incubation, while using 50 per cent. dilutions under the same conditions practically always prevented growths.

Control scrapings of skin taken from the abdomen above the umbilicus over periods of time varying from two minutes to two hours when 40 per cent. dilutions were used, always showed negative results as to colonies.

Cultures from hair and skin that had been subjected to 50 per cent. dilution of tincture of iodine never produced growths.

Tincture of iodine diluted with an equal amount of absolute alcohol may be considered reliable as a local application for the skin or mucosa in any part of the body. Dilutions of less strength are unreliable if hairs or large hair follicles are in the field of operation.

The 50 per cent. dilution of tincture of iodine, if not carelessly applied, is not likely to injure the skin.

S. J. A.

Tetrapol as a Disinfectant.

Polano (*Zeitschr. f. Geb. u. Gyn. Hft.* lxviii, Bd. 3) believes that, since the introduction of von Herff's alcohol-acetone method of hand disinfection, the dogma of the impossibility of perfect hand sterilisation can no longer be maintained, nor the associated belief in the unqualified importance of rubber gloves. In an endeavour to obtain a disinfectant as potent as the alcohol-acetone mixture, and at the same time cheaper, he has experimented very successfully with "Tetrapol." This substance is a tetrachlorcarbon, made soluble in water and mixed in a concentrated solution with "Monopol soap." He records a series of rigidly severe tests to which he put the mixture, and comes to the conclusion that a 2% Formalin-Tetrapol mixture gives within five minutes a disinfection of the hands that may be relied upon in obstetrical and gynæcological operations. The mixture has the effect of hardening the skin, and for this reason is not so desirable for use in an institution as for the general practitioner, who is not so constantly using it.

In the course of his experiments he found that alcohol and formalin in conjunction do not make a satisfactory disinfectant mixture; whereas acetone and formalin in combination have too much effect upon the skin to render them useful in this way. The attempt to find a cheaper substance to take the place of acetone was not rewarded with any success.

R. W. J.

Transfusion of Salt Solution with Suprarenin.

Neu, Heidelberg, discusses the use of this remedy (*Volkmanns Samml.*, No. 622, 1911) especially in relation to severe peritonitis. Neu runs over the notices in medical writings of the experience of this combination and shows that it cannot be regarded as a cure, especially in those cases of peritonitis in which there are bacteria actually in the general circulation. He does claim however that it is of marked use in showing whether the patient can still react to treatment.

Neu maintains that many of the features are due to a vasomotor disturbance, especially of the central nervous system. The splanchnic vessels are gorged while the peripheral vessels are empty—including the blood-vessels of the brain and heart. The injection of salt solution and small doses of suprarenin gives the circulation a chance of re-establishing itself, and in grave cases should be used before doing an enterostomy for the relief of intestinal distension. The distension may be due, as in one of his cases to a mechanical obstruction, but is usually due to paresis of the intestinal wall, chiefly in the small bowel. The seat of election accordingly for incision is in the middle line above the umbilicus, where a loop of the distended bowel can be incised transversely for about ½ to 1 centimetre, and closed without drainage after evacuation of the contents. His own results with the suprarenin have not been very encouraging, not nearly so good as Heidenhain's. He makes use of about one litre of salt solution containing 6 or 8 drops of one in one thousand solution of suprarenin, injected directly into a vein with a glass canula at very low pressure. The action is partly mechanical in giving the previously empty heart something to work on, and, as explained above, the failure of the circulation is the essential cause of death in peritonitis, though the respiration, at the end, fails before the blood

circulation. Hurried breathing, without pulmonary complication, is a symptom of grave import.

A second indicaion for the use of this method is severe hæmorrhage, such as is seen in cases of rupture of a pregnant tube.

The results of experiments on animals are also given. E. H. L. O.

One Hundred Consecutive Cases in which Vaginal Drainage has been Employed.

A. W. Elting and J. L. Donhauser (*Surgery, Gynæcology and Obstetrics*, July 1911). The writers of this article tabulate the opinions of various surgeons as to the correct indications for pelvic drainage after abdominal sections. The following appear to be the most generally accepted conditions in which it is considered wise to drain the pelvis :—(1) When there is free pus in the peritoneal cavity. (2) When it is impossible to remove the whole of a pyosalpinx or other abscess. (3) When the gut, bladder or ureter has been injured. (4) To prevent oozing and provide an exit for serum when a large raw area has to be left in the pelvis. (5) To drain tuberculous peritonitis.

If the pelvis is to be drained the authors hold that the vagina is the best route to employ; and they adopt the ordinary technique of opening the pouch of Douglas by cutting on to the points of a pair of forceps introduced into the vagina by an assistant. But care is necessary even in this, for in two of the hundred cases mentioned in this article the assistant passed the forceps through the urethra instead of through the vagina. W. W. K.

Three Operations for Malformation of Uterus.

Goullioud (*Revue de Gyn.*, June, 1911) reports three operations for malformations of the uterus. The first was a case of hæmatometra of a rudimentary uterine body. It was removed by a procedure similar to a myomectomy. The second uterine body with its appendages was not removed.

The second was a case of hæmatometra which was due to a stenosis near the internal os. Laparotomy was performed and the bladder turned down and the uterus incised. The obstructing tissue was removed and the cavity of the uterus drained by the vagina.

The third was a bi-partite uterus which was removed by total abdominal hysterectomy. C. W.

End Results when Hysterectomy has been done and one Ovary left.

J. O. Polak (*Surgery, Gynæcology and Obstetrics*, July, 1911) has analysed the after-histories of 103 supravaginal hysterectomies. Of these cases 75 were operated upon for myomata and in 43 both ovaries were removed, while in the remaining 32 one ovary or part of an ovary was left. Hysterectomy was performed in 28 cases for chronic pelvic inflammation but in only one case was an ovary conserved. The author concludes (1) that if one or both ovaries are healthy they should be conserved; (2) that it is better to perform total extirpation than to leave an unhealthy ovary; (3) that if the patient is near the menopause complete ablation gives the best results; (4) that the nervous phenomena are less marked after double oöphorectomy if the patient is anæmic or toxæmic at the time of the operation; (5) that the symptoms of the artificial menopause are less marked when both ovaries are removed for pelvic inflammation than when the operation is performed for myomata. W. W. K.

The Operative Treatment of Retroversion and Prolapse of the Uterus.

A. E. Morrison (*Lancet*, Sept. 16, 1911) says: Prolapse of the uterus occurs from the following causes: (1) Tearing or stretching of the posterior segment of the pelvic floor, which consists chiefly of the levator ani and the deep pelvic fascia. (2) Increased intra-abdominal tension and alteration in the line of projection of the intra-abdominal pressure; and (3) stretching of the parts forming the anterior segment of the pelvic floor.

In the natural condition of the pelvic cavity with the bladder empty, the uterus lies somewhat anteflexed on the bladder and any increase in the intra-abdominal tension tends to increase this anteflexion. When the bladder is full the reverse is the case and a stretching of the anterior pelvic ligament takes place, and if continued this may lead to permanent retroversion or retroflexion, but unless the posterior segment of the pelvic floor is weakened or destroyed prolapse will not take place.

Thus, a torn perinæum with stretching of the utero-sacral ligaments and vesico-vaginal septum, together with a large flabby subinvoluted uterus, allows any increased intra-abdominal strain, such as lifting, etc., to produce a prolapse more or less complete.

An operation to cure this condition must therefore aim at three things: (1) Restoration of the perineal body, (2) Replacement of the uterus to its normal position, so that the intra-abdominal pressure is again exerted in the normal direction (downwards and forwards), and (3) Improvement in the condition of the anterior segment.

He continues, that as many cases occur in women before the menopause, operations which fix the uterus to the anterior abdominal wall are to be condemned, as if pregnancy occurs they may interfere with the natural course, and postpartum hæmorrhage is said commonly to follow labour when the uterus is thus fixed. Moreover the adhesions that form between the uterus and abdominal wall may stretch and give rise to a band over which intestine may become strangulated.

His operation is as follows. The abdominal cavity having been opened and the intestines packed off, the uterus is pulled upwards with forceps and each round ligament seized with forceps about its centre. Another pair of forceps is passed through each broad ligament 1 to 2 inches below its superior margin and as near to the uterus as possible. The round ligaments are now caught in the forceps, passed through the broad ligaments and drawn through the latter until their loops meet behind the uterus. A strong silk suture is then passed through them, including the back of the uterus, and is tied. In severe cases a second suture is inserted in the same way, an inch lower down, to make a broader sling from which the uterus hangs, the abdominal wall is then closed.

The author says "the position of the uterus is now entirely changed, it is raised high up in the pelvis, anteverted and lying on the bladder; the broad ligaments are tightened up by the passage of the round ligaments through them, the utero-sacral ligaments are also drawn upwards and both anterior and posterior vaginal walls are tightened."

He has operated on 25 cases since June, 1909, all of which have been successful and he gives a list of 19 cases. None of the cases have become pregnant since operation, so he is unable to record the behaviour of the uterus during this period and subsequently.

J. M. W.

On the Ætiology of Fibro-myomata.

Wladimiroff, Kazan (*Volkmann's Samml.*, N. 621, 1911), gives summary reports of 60 cases observed in the clinique at Kazan. In the first half of these the family history recorded syphilis in 33—66%, while in the second half the percentage rose

to 80—90. The vagueness of the figures is due to the doubtfulness of the history especially in regard to supposed hereditary syphilis, and there is no indication of the incidence of the disease in the general population. Two women among the patients were successively married to the same syphilitic husband. Where mother and daughters were found to have fibroids the writer assumes that the causation is hereditary syphilis if it can be shown that the husband of the mother had that disease.

The fibroids of syphilitic origin are divided into two groups: in the smaller first division are placed the cases arising from direct action of the syphilitic virus; in the second larger division containing those arising from the action of the antibodies of syphilis, metasyphilitic like cases of locomotor ataxy and general paralysis. In the first group the tumours are characterized clinically by their small size and slow growth and by the fact that they are influenced by anti-syphilitic treatment. The second group contains the large tumours—some of them of rapid growth, and they are not favourably, rather unfavourably, affected by anti-syphilitic treatment. Fibroids are often associated with other metasyphilitic manifestations in the patient or her husband. This association of fibroids with metasyphilis and with hereditary syphilis has not yet been sufficiently studied. The absence of tertiary manifestations in the uterus itself makes the etiology of fibroids somewhat doubtful. The association of fibroids with developmental anomalies—bihorned uteri and so on—is probably due to congenital syphilis. Gummatous tumours of the striped muscles show striking analogies with fibromyomata; such tumours often become fibrous without any softening of the centre of the gumma: they also throw light on the cardiac troubles that complicate the symptoms of fibroids. Seeing that the vascular system is the chief channel of syphilitic infection the vascular origin of fibroids can be easily explained.

E. H. L. O.

The Function of the Ovary.

Robert T. Frank (*Surgery, Gynæcology and Obstetrics*, July, 1911). The author begins with a brief survey of the constituents of the ovary. The corpus luteum, he thinks, originates in the granulosa and is therefore epithelial in origin, which is in accordance with its glandular functions. The atretic follicles are composed of fibrous tissue and are inactive. In certain animals there is an interstitial gland consisting of epithelioid cells situated in the ovarian stroma. The origin and function of these cells are alike uncertain. Maturation of the Graafian follicle, in almost all animals, coincides with the proœstrum, the homologue of menstruation, but ovulation which usually follows shortly after need not coincide with the œstrus. The corpus luteum has some action in the production of the decidual tissue in the uterus, for, after coitus (the tubes having been ligatured), mechanical irritation of the endometrium produces a growth of decidual cells; but if the corpora lutea have been removed previously this reaction does not take place. The corpus luteum is essential to the nidation of the ovum, but once firmly fixed removal of the corpora lutea does not produce abortion. Judging from certain experimental evidence it is possible that the corpus luteum has some inhibitory influence over ovulation. It has been assumed that the fœtus or its productes was responsible for the persistence of the corpus luteum, but the author is now conducting some experiments on "experimental teratomata," which so far do not support this view.

While it is admitted that the ovaries are in close association with the development of the breasts yet there is little to show how this influence is exerted. Very little likewise is known about the chemistry of the corpus luteum, but the author inclines to the belief that the active principle is a ferment. With regard to the important question of ovotherapy the author has been unable to find any evidence, either clinical or experimental, that these extracts have the slightest influence over the genital organs; it is possible that they may influence general metabolism. In

conclusion, the author suggests that certain amenorrhœas may be due to persistence of the corpus luteum; while sterility may be ascribed to lack of coincidence between the procestral and œstral changes. A long bibliography is appended.

W. W. K.

Conservation of the Ovary.

W. W. CHIPMAN (*Surgery, Gynæcology and Obstetrics*, July, 1911). Beginning with an interesting cytological study of the development of the ovary, the author goes on to argue that the internal secretion of the ovary, even in fœtal life, exercises a very marked influence over metabolism and the sex characteristics of the female. The quiescent period of childhood is followed by renewed ovarian activity at puberty. The parenchyma cells produce the substance (or substances) which, by acting on the general metabolism, determine the growth of the uterus and the menstrual cycle. The lutein cells add a secretion whose special function is associated with the embedding and subsequent nutrition of the fertilized ovum. In this connection it is noteworthy that the degenerative changes in the placenta during the later months of pregnancy coincide with the disappearance of the lutein cells. The study of this subject is complicated by the very close connection which exists between the internal secretion of the ovary and that of the other ductless glands; the combined action of these glands seems to exercise a profound influence over the metabolism—especially the calcium metabolism—of the body.

With regard to the value of ovarian transplantation, the author points out the difficulty of correctly estimating the results of this operation, since it is difficult to exclude the presence of supernumerary ovaries. In addition, the ovarian ligament may contain ovarian elements which may take on the functions of the excised ovaries.

Ovarian medication has given excellent results in Professor Chipman's hands. He mentions one case of a young woman who had been reduced to a state of "chronic surgical shock and profound mental instability" from the "felonious" removal of her ovaries for dysmenorrhœa. Three months' treatment with ovarian extract "re-created" her.

The author holds very strongly that it is almost always possible, except in malignant cases, to save some part of the ovaries; and in this connection again reminds us that the ovarian ligament often contains active ovarian tissue, and hence the preservation of these structures may prevent the symptoms of the artificial menopause, even when both ovaries have to be removed. Finally, the author states that to remove the so-called fibro-cystic ovaries is a surgical blunder, while to excise the ovaries for dysmenorrhœa almost amounts to a felony. W. W. K.

Is there any Clinical or Experimental Proof that the Ovary has an Internal Secretion?

W. H. MORLEY (*Surgery, Gynæcology and Obstetrics*, July, 1911). The writer has studied the results produced by the injection of castrated rabbits with an emulsion of corpora lutea; and he finds that there is a definite increase in protein metabolism, as evinced by the increase in the output of P_2O_5 in the urine. These experiments together with the clinical histological data collected from literature lead him to believe that the corpora lutea have an internal secretion, and that extracts of this body have a definite action in the relief of the symptoms of the menopause. W. W. K.

Ovarian Transplantation in Lower Animals and in Women.

FRANKLIN H. MARTIN (*Surgery, Gynæcology and Obstetrics*, July 1, 1911) has been performing routine transplantation of the ovaries, whenever necessary, for the past three years and, although he has not kept an accurate account of his cases, he has been able to trace six patients who have continued to menstruate, and one other

who has aborted at six weeks. From a review of the published work on auto- and hetero-transplantation of the ovaries since his last paper (1908) the writer sums up the present position of our knowledge on this subject as follows :—(1) Auto-transplantation of the ovaries can be performed successfully. (2) The graft must be attached to well nourished tissue such as the horn of the uterus, the broad ligament, the peritoneum or even the abdominal muscles. (3) Such grafts prevent the onset of the symptoms of the artificial menopause. (4) Hetero-transplantation is not so successful, but close consanguinity between the individuals is a material aid to success. (5) In hetero-transplantation there is evidence of a definite antagonism between the graft and the tissues which is not apparent in auto-transplantation. The author gives a full bibliography consisting of 93 references to the literature on this subject. W. W. K.

Ovarian Hæmatoma Causing Dysmenorrhœa.

Mériel (*Soc. Obstet., Toulouse,* 1911, vol. xiii, No. 2, p. 84). The patient was a girl, aged 14, who had not previously menstruated. The first period lasted for one day only without pain. From that time the menstrual molimina took place regularly each month but without any flow of blood. There was however increasing abdominal pain and the gradual formation of a tumour distinct from the uterus in the right iliac fossa. On abdominal section this proved to be the right ovary considerably enlarged and in a cystic condition and filled with dark coloured blood. The pedicle of the cyst was not twisted and the uterus was healthy. After removal of the tumour menstruation was normally established. The author points out that the left ovary apparently did not function while the diseased ovary was present.

J. B.

Tuberculosis and Carcinoma of the Fallopian Tube.

Von Franqué (*Zentralbl. f. Gynäk,* No. 27, 1911) took part in a discussion on the relation of tuberculosis to the genito-urinary tract in the female. He exhibited sections from a case of carcinoma of the Fallopian tube. There was plain evidence that the affected tube had been the seat of an earlier tuberculous infection. There were patches of old, atypical tuberculous epithelial growths. It was not, however, in their midst that cancerous elements were detected. On other parts of the tube, on the surface of the mucosa and in glandular growths present at several points, where the tubal epithelium was otherwise normal and quite free from tuberculous elements there was undoubted carcinomatous deposit. Von Franqué believed that continued chemical irritation in these cases of tubercle of the female organs acted as in those better known instances of cancer of the integument developed around the opening of a tuberculous fistulous tract. At the same meeting, Von Franqué exhibited sections from tuberculous uteri and Fallopian tubes and pointed out that the atypical epithelial growths closely resembled carcinomatous deposits. A. D.

The Liver in Pregnancy and the Puerperium.

Ciula (*La Ginecologia Moderna,* May, 1911) refers to various theories on the function of the internal secretions of the liver, and describes researches he has recently made on its histologic changes in cats and guinea-pigs during pregnancy and the puerperium. The general changes he noted were hypertrophy and hyperæmia of the organ, and in the case of the cat increased greasiness to touch.

Histologic examination showed marked changes in the blood-vessels, the stellate cells of Küpfer and the hepatic cells. (1) The blood-vessels were dilated and full of corpuscles, the leucocytes being chiefly large mono-nuclear, and many of these of the type named by Metschnikoff "wandering cells of Küpfer," very similar to macrophagocytes found in the spleen during times of hyper-function. A characteristic of these cells was the presence in their protoplasm of corpuscular and nuclear debris,

pigments and fat. (2) The stellate cells of Küpfer became very evident during pregnancy especially in the cat. They were seen projecting into the lumen of the blood-vessels and recognised by their large oval nuclei with chromatin fibres. No trace of glycogen was found in the cells. The protoplasm contained (*a*) debris of blood-cells, polynuclear leucocytes being rare in pregnancy, (*b*) granules of fat, chiefly stable fat or olein, rarely vacuoles of lecithin staining by Ciaccio's method, (*c*) pigment granules, most of which reacted to tests for iron. These had become so numerous in some cells that the nucleus was atrophied and pushed to the periphery, (*d*) black or coffee-coloured granules (purin bodies). (3) The hepatic cells were hypertrophied, their nuclei were enlarged often double and had large nucleoli. Many nuclei stained intensely with hæmatin, which reaction is not often seen in the normal animal. As in Küpfer's cells, there was evidence of great increase in the quantity of iron pigment, stable fat, and purin bodies. The quantity of lecithin fat was not much increased. Glycogen had become very abundant, varying directly as the stages of pregnancy. In the puerperium, the cells returned gradually though never quite completely to their normal state. In the first days an increase in fat was seen, especially in the cat, in which the appearance of a fair quantity of lecithin was also noted.

Reviewing various hypotheses as to the ultimate end of increased production of glycogen and fat, Ciulla thinks it probable that these secretions stand in direct relation to the reserves needed for the nourishment of the fœtus, for the efforts of parturition, and for the establishment of the function of lactation. The antitoxic function of glycogen and of fat requires more proof, and seems to find it in contemporaneous research. Valdagni has shown that diminution in the glycogenic content of the liver may be the first signal for the outbreak of an autointoxication due to pregnancy.

Rebaudi, as a result of research on the percentage excretion of colloidal nitrogen during pregnancy, concludes that excretion is specifically related to liver function, and that "in normal organisms pregnancy never induces functional insufficiency." He shows that in a healthy pregnancy any slight tendency to insufficiency occurs during the first three months. This is precisely the time when the quantity of fat in the liver is small, therefore its increase during the last six months cannot disturb hepatic function, since the nitrogen excretion indicates no inefficiency. An antitoxic function for fat cannot absolutely be excluded, and the increase in lecithin during the first days of the puerperium, may be a final effort for the protection of the organism.

The production of iron seems to be related to the reserve in hæmoglobin found in the corpuscles of the child at birth, a quantity much superior to that of the adult, and which compensates the child for the small quantity present in the maternal milk.

It is clear that considering the enormous strain thrown on the liver, its functional equilibrium must be unstable, and even small causes may contribute to break it down, leading to such grave diseases as eclampsia or acute yellow atrophy.

J. H. F.

Pituitrin and Pantopon in Midwifery.

Schmid (*Gynækologische Rundschau*, V. Jahrg., 15 Heft) reports an experience with pituitrin and pantopon used separately and in combination and his conclusions may be summarised as follow.

1. Pantopon is a valuable and safe drug to allay the pain of labour and the after-pains. The unpleasant effects of morphine are absent. The efficiency of the contractions is unaffected in small doses; in larger doses the labour is delayed. Of the children about 25% are born apnœic, but this is temporary and is unattended with any evil results.

2. Pituitrin is the best drug for the treatment of post-partum hæmorrhage. It can be used with safety before the delivery of the placenta. It is a safe means of

stimulating the labour pains. The only unpleasant results are the after-pains associated with its use which are present in 50% of the cases.

3. By a combination of pantopon and pituitrin it is possible to soothe the discomfort of labour and in addition, where the efficiency of the contractions is wanting to remedy this and, where necessary, actually to increase it beyond the normal.

J. Y.

Salpingostomy and Pregnancy.

G. Gellhorn (*Surgery, Gynæcology and Obstetrics*, July, 1911) reports the case of a patient who, after an attack of pelvic peritonitis of obscure origin, developed a tubo-ovarian cyst on one side and an occluded tube on the other. The tubo-ovarian cyst was removed and salpingostomy performed on the occluded tube. The patient subsequently became pregnant. The author considers that the low percentage of pregnancies following this operation is due to the faulty selection of cases. The operation should not be performed on gonorrhœal or tubercular tubes because the destruction of the ciliated epithelium, which occurs in these cases, would of itself prevent pregnancy; cases of pyosalpinx or greatly distended hydrosalpinx are also unsuitable. Gellhorn would limit the operation to those cases in which the tubes are closed from peritonitic irritation (e.g., following appendicitis or ectopic gestation), or to moderate degrees of hydrosalpinx with fairly thick walls. The author has operated a second time on three patients upon whom he had previously performed salpingostomy but in only one was the tube found to be patent. W. W. K.

At what Stage in Pregnancy does the Head Engage?

Audebert and Baux (*Ann. de Gyn. et d'Obstét.*, July, 1911) come to the conclusion that the greatest diameter of the fœtal head passes the superior pelvic strait about 16 days before labour in primiparæ and during labour in 80 per cent. of multiparæ—in the remaining 20 per cent. it may engage from 2 to 41 days before labour. The exact position of the head in each case has been laboriously worked out by a complicated method requiring an almost impossible accuracy of palpation. All the patients were at full term but neither the size of the child or lesser degrees of pelvic contraction seem to have been taken into account.

C. W.

Developmental Anomalies of the Bony Pelvis.

Hegar, Freiburg i. B. (*Volkmanns Samml.*; No. 639, 1911, classifies the anomalies in about twenty divisions according as they are due to fœtal or post-fœtal anomalies of growth. He discusses the classifications of Schauta, Bayer and others. He admits that if we separate the fœtal and infantile groups we mean that we distinguish the time only at which the anomalies become manifest. The paper does not lend itself to abstraction but the classification is as follows :—

A. Abnormal pelves from disturbance of fœtal development.
  I. From faults in the "original design."
    1. Deformed pelves.
      (*a*) Pygopagous pelvis.
      (*b*) Split pelvis. *Spaltbildungsbecken.*
      (*c*) Pelvis with defect in the ossification of the sacrum.
    2. *Assimilationsbecken* in which there is disturbed relation of the proper levels of spinal column and pelvic bones.
  II. From qualitative disturbances of growth.
    3. Chondrodystrophic pelvis.
  III. Anomalies in the dimensions.
    4. Simple flat pelvis.

B. Abnormal pelves from post-fœtal developmental defects.
  I. From disturbances of a qualitative sort.
    5. Rachitic pelvis.
    6. Dwarf pelvis with delayed or absent ossification of the epiphiseal cartilages and synchondroses.
    7. Cretinoid dwarf pelvis.
    8. Giant pelvis.
  II. Anomalies in growth of a more quantitative nature.
    (*a*) Purely quantitative anomalies with normal proportions.
    9. Generally contracted pelvis (or generally hypoplastic pelvis) in extreme degrees "true dwarf pelvis."
    10. Generally enlarged pelvis.
    (*b*) Purely quantitative anomalies with incomplete proportions.
    11. Generally contracted pelvis of infantile type.
    (*c*) Hypoplasia slight or absent but with disproportion.
    12. Infantile pelvis.
      (*a*) Pelvis with partial infantilism without marked abnormality of shape.
      (*b*) Funnel-shaped pelvis. E. H. L. O.

The Clinical Significance of Albuminuria in Pregnancy, Labour, and the Puerperium.

Jaeger (*Zeitschr. f. Geb. u. Gyn.*, Bd lxviii, Hft. 3) records the results of a systematic examination of the urine of patients in the Elberfeld Maternity Hospital. He used the acetic acid test, controlled by Heller's nitric acid test. He found that in the last months of pregnancy albuminuria was present in as many as 70% of his cases. This is in contrast to 45% in Trantenroth's series, 50% in Fischer's, 17% in Zangemeister's, and about 10% in most other authors' series. In 25% of these cases he found that the albuminuria was affected by the posture of the patient and he regards it as in the category of orthostatic albuminuria. In all his cases a systematic examination of the deposit was made, and where necessary controlled by bacteriological examination of a catheter specimen. The author concludes that not infrequently the underlying cause of the albuminuria is a latent bacterial infection, not sufficiently pronounced to give rise to any symptoms of cystitis or pyelitis or nephritis. Two cases in his series of this nature were followed by nephritis after labour, the order of symptoms and the urinary findings pointing clearly to an ascending infection.

During labour it was exceptional to find albumin absent from the urine. The quantity of albumin varied directly with the severity of the labour, and was thus usually more marked in primiparæ than in multiparæ. Casts were found in the urine of about half the cases during labour, especially in primiparæ.

R. W. J.

Tuberculosis and Pregnancy.

Frigyesy and Királyfi (*Gynækologische Rundschau*, V. Jhrg., 10 Heft) contribute a valuable article with an account of the literature on the above subject. They discuss fully the influence of pregnancy on the tubercular process (especially pulmonary) and conversely the effect of the disease on the course of the pregnancy.

Of 61 cases personally investigated they found that in 15 the origin of the disease could be traced to the present pregnancy, in 16 it developed during or before the preceding pregnancy, in 22 it developed in the interval between the preceding pregnancy and the present one. In 8 it was doubtful. 19 of the cases were primiparæ, 16 biparæ. These together comprised 57·4 of the cases.

They place their cases in three classes according to the stage in which the disease

is present. 28 cases fell under stage one. Of these 21 had a normal labour, 2 had spontaneous abortion, 1 spontaneous premature labour, 1 had an artificial induced abortion, and 1 in artificially induced premature labour (for hyperemesis). In 21 cases the puerperium was normal. Two of the labours classed as normal were attended with hæmoptysis.

In the second stage there were 27 cases. Of these 14 had a normal labour. Two in this number had hæmoptysis during labour. Four had spontaneous abortion, 5 artifically induced abortion. In one case the child was born dead. The puerperium is classed as normal in 14 cases, febrile in 12. In two cases there was a marked progression of the disease. Of those which followed after the puerperium 4 died in the first year.

Two cases came into the third stage. In one there was spontaneous abortion, in the other birth at full time with marked fever. The first case died after the birth, the second within the year afterwards.

The conclusions which the authors deduce from their cases are these :—

In the large majority of cases the beginning of the tubercular process can be traced to the present or to a preceding pregnancy.

In the majority of the cases a progression of the disease is noted during pregnancy. This is more marked the more advanced the disease is at the time of the conception.

In the less marked cases pregnancy, labour and puerperium pursue a more favourable course than in the severe cases, where pregnancy usually has a fatal termination.

Tuberculosis of the larynx is a very severe complication.

Tuberculosis leads to an interruption of the pregnancy only in the more advanced cases.

As regards the question of interfering with the course of the pregnancy, the authors make the following statements :—

The pregnancy should be interrupted in the early months where the disease has reached the second stage and especially if it tends to get worse. The same will apply to the early cases. Further, pregnancy should be terminated when the disease has developed in the present pregnancy or when, in previous pregnancies, the labour and the puerperium exerted an unfavourable influence on the disease.

Artificial interruption of pregnancy in the interests of the mother is indicated only in the early months. It is contraindicated in the second half of pregnancy.

An absolute indication is laryngeal tuberculosis with the exception of those cases where the pulmonary disease has advanced to a hopeless degree.

According to the authors, in every case of advanced and progressive phthisis, the pregnancy should be allowed to continue in the interests of the child.

J. Y.

Pregnant Double Uterus.

A. E. Adren (*Journ. Am. Med. Assoc*,, vol. lvii, p. 213, 1911) The patient was a multipara, 37 years old. She had had three miscarriages and six living children. She had menstruated regularly every four weeks and there was apparently nothing unusual about her anatomy.

Labour began on the morning of May 27, pains coming almost every fifteen minutes. Dilatation almost the size of a dollar. The cervix was unusually high and upon external examination two tumours were found one on the left and the other to the right of the abdomen. The diagnosis of twins was made. The characteristic thing about the abdomen was a decided crease between the two tumours. Pains still coming regularly in the afternoon but dilatation progressing very slowly. At 9-30 p.m. dilatation was complete, but nothing accomplished in the way of expulsion.

As the patient was getting weak she was put under complete anæsthesia and a high forceps delivery was performed of the presenting baby. The placenta was also delivered, but no second baby. On exploring the vagina again a second cervix was

found partly dilated and separated from the first by a partition about 1 inch in thickness. There was a second uterus containing a fully developed baby which was delivered by high forceps. Both babies (girls, each weighing 5 pounds) are still living. The mother made a normal recovery. C. N. L.

The Funnel Pelvis.

J. Whitridge Williams (*Amer. Journ. of Obstetrics*, July, 1911) in a paper of some length comes to the following conclusions based on the observation of 1,200 consecutive patients.

That in typical funnel pelves the distance between the tubera ischii is reduced to 8 cm. or less, while the usual measurements remain unchanged.

Such pelves were noted in 6·1 per cent. of 2,215 consecutive full term labours, are of equal incidence in white and black women and sometimes give rise to serious dystocia.

The funnel pelvis is the most common abnormality in white women, in whom it constitutes 44 per cent. of all deformed pelves. In coloured women, on account of the greater incidence of the more usual types, it is relatively less important, and stands fourth in order of frequency.

The prognosis depends not so much upon the actual narrowing of the pubic arch or upon the distance between the tubera ischii as upon the relation between the latter and the posterior sagittal diameter.

Moderate degrees of dystocia can frequently be overcome by placing the patient in an exaggerated lithotomy or an exaggerated Sims' position. In either event the anterio-posterior and posterior sagittal diameters undergo an average increase of 1·62 cm., which may so increase the available space as to make spontaneous labour possible.

Such an enlargement affords an explanation for the successful outcome of certain low forceps operations, which appear theoretically impossible from the measurements taken in the usual position.

Pubiotomy is the operation of choice in cases of pronounced dystocia, as it not only effects the delivery of the child, but leads to a permanent increase in the size of the outlet, which may be further enlarged by the softening of the fibrous union under the influence of the hyperæmia incident to pregnancy, and thus make possible the spontaneous termination of subsequent labours. S. J. A.

Diagnosis and Treatment of Contracted Pelvis.

J. M. Munro Kerr (*Surgery, Gynæcology and Obstetrics*, July, 1911). Full justice can not be done to this paper in an abstract, and those interested should read the original which contains some interesting tables showing the comparative fœtal mortality with forceps and spontaneous deliveries.

Under the heading of diagnosis the author recommends pelvimetry in addition to his well known bi-manual method of estimating the relative size of the fœtal head and the pelvis. An accurate estimate can thus be made as to the probability of the head passing through the pelvis at term provided that the examination is made at the 36th week and under an anæsthetic. At a later date the method is less reliable.

Treatment. Spontaneous delivery is very common in cases in which the C.V. is 9·3 cm. or over, and hence these should be left to nature provided that neither the mother nor the child are endangered.

Turning to the consideration of forceps delivery in contracted pelvis, the author strongly deprecates their promiscuous use. He formulates the following rules for their employment :—

(1) Spontaneous delivery might have been reasonably expected.

(2) The second stage might have lasted until there are indications in the mother or child for hastening delivery.

(3) The head must be fixed and the operator be able to deliver with moderate traction.

Without entering into a discussion as to the relative merits of pubiotomy and symphysiotomy Munro Kerr favours the former operation : and he limits it to those cases in which, after waiting for spontaneous delivery, forceps just fail to deliver. With this careful selection "suspect" cases may be treated by pubiotomy for there will be no serious vaginal lacerations with the consequent infection of the cellular tissues.

In Munro Kerr's hands induction of labour has given an infant mortality of over 30%. He does not think that it is a suitable operation for hospital patients from whom it is very difficult to get the exact date of the last menstrual period. He lays down he following rules :—

(1) The C.V. must not be less than 8·1 cm.

(2) The pregnancy must have advanced at least to the 36th week.

(3) The patient must be a 2-para at least, as the first labour is a "test labour."

In clean cases, with such pelvic contraction as to exclude forceps or pubiotomy, the classical Cæsarean section must be performed. But in suspect cases there are three alternative methods of treatment, viz., craniotomy, pan-hysterectomy, extra-peritoneal Cæsarean section.

Craniotomy is advised for all cases when the child is dead or dying provided that the C.V. is 6·2 or over. If the child is alive the author also recommends craniotomy in "suspect" cases in young and healthy women, for they will in all probability become pregnant again and can then be delivered by Cæsarean section.

If Cæsarean section is to be performed in "suspect" cases pan-hysterectomy is undoubtedly the safest; and the operation is advised for women who are near the menopause, and who therefore will not have another chance of becoming pregnant.

Extra-peritoneal Cæsarean section does not find favour with the author on account of the dangers of infection of the cellular tissue.

Finally, as a treatment for "suspect" cases less radical than craniotomy or pan-hysterectomy, the author recommends that, after the delivery of the child by the classical Cæsarean section, the placenta and membranes should be separated and pushed down into the vagina with swabs, so as to avoid carrying organisms from the region of the cervix through the abdominal wound. W. W. K.

Pituitrin in Labour.

Stiassny (*Gynækologische Rundschau*, V. Jahrg., 13 Heft) advises the use of pituitrin in combination with morphine and scopolamine to prevent the lagging of the uterine contractions apt to occur after the injection of the sedatives. He records a case in which he injected morphine and scopolamine and in which the uterine contractions began to diminish in intensity within half an hour. He then injected a phial of pituitrin (Parke, Davis and Co., 0·5 cm.^{3}=0·05 gland substance). Ten minutes later the contractions recovered their intensity without any increase in the discomfort to the patient. The child was born fresher and with a better pulse than usually accompanies the use of the sedatives alone. J. Y.

On Serum Treatment of Puerperal Sepsis.

Bohnstedt (*Monatss. für Geb. ü Gyn.*, Bd. xxxiv, Heft 1, S. 46). A fresh successful case is added to those already reported by Bohnstedt and he is now able to give his experiences in 26 cases of puerperal sepsis treated by this method. The patient was a 2-para, aged 34, who became fevered on the third day after an uncomplicated confinement—she had rigors and complained of feverishness and weakness when she was admitted to the clinic. The pulse was 110 and the temperature was

running from 37·4°C. to 40·6°C., showing a swinging character. Beyond this there were no signs of illness—the lochia were scanty but practically odourless—the uterus soft and reaching to the umbilicus, with no pathological contents. In spite of ordinary local and general measures, the conditions grew worse, with continuing high temperature, marked restlessness, delirium at night, and rigors almost daily until on the twelfth day of the puerperium and tenth day of the illness 50 ccm. of anti-puerperal serum, obtained from the bacteriological laboratory of the Imperial University of Moscow, was subcutaneously injected, with the result that on the same evening the temperature was high but fell towards the next morning, rose a point or two higher in the evening of the second day than it had been on the evening of the injection, thereafter falling during the next 24 hours and remaining normal, with rapid improvement in the general condition, speedy diminution in size of the uterus, and complete convalescence and discharge of the patient within a fortnight.

Owing to the author's remoteness from scientific centres he is unable to give any bacteriological particulars, but he points out that this state of things is common and should not prevent the general practitioner from adopting certain methods of treatment, although a bacteriological diagnosis is unattainable.

He has seen amongst his 26 cases treated with serum other four besides the one above described, where accompanying severe signs of general infection, no pathological changes, apart from more or less distinct tokens of endometritis, were to be found, and in all these four cases the same reaction showed itself after a single injection of 40—50 ccm. of antipuerperal serum—that is, on the evening of the day of injection the temperature reaches the same height as before with a more or less pronounced remission next morning followed by a second rise, and thereafter by a fall to normal or subnormal within the next one to three days. The paper is illustrated with curves showing this feature, which has been pointed out by Burkhardt also and stated by him to be typical.

The author thinks it possible that there is a specific action of the anti-puerperal sera when one considers that in the rest of his cases where there was distinct local mischief or complications affecting the internal organs, such typical reaction failed to appear, and the serum injection gave either no result or at most, an uncertain one, so far as the effect on the temperature was concerned.

Furthermore, one case is cited by him where apart from distinct endometritis, no local mischief could be defined, and where three injections of serum from two different sources of preparation gave no reaction. In this case, which was bacteriologically examined, the lochia gave a pure culture of staphylococci, and this is apparently the explanation for the ineffectiveness of the sera which were anti-streptococcic.

The writer then proceeds to an analysis of the various cases treated by him and finally states his case thus :—

In spite of theoretical objections to the likelihood of usefulness in such sera as are at present available, the results obtained justify their employment—and that too, even late in the course of the case. It might be objected that in the author's cases the improvement was spontaneous and by chance coincided with the serum injection —to which argument he replies that other observers, as well as himself, have demonstrated a typical reaction which recurs in case after case.

There can be no objection to the procedure, seeing that in no instance was any injury produced by it—it never made matters worse even where many injections have been made; the worst that can happen is that it is inert, as in the most serious cases, in some it benefits slightly and may modify the course of the disease, while in others a visibly rapid improvement follows the injection. He therefore urges the use of such sera in all severe puerperal cases.

W. R. P.

The Importance of Drainage in Septic Conditions of the Uterus.

MACLACHAN (*Lancet*, July 22, 1911). After discussing some of the literature on this subject including statistics from the Glasgow Maternity Hospital, the author gives the symptoms of puerperal septicæmia and says "the first thing, and I believe the thing that is seldom done, is to make a thorough inspection of the parts and see where the focus of infection lies."

His treatment depends on the site of infection, if the perinæum—frequent cleansing of the parts, application of iodoform or other antiseptics and a gauze drain to allow free exit to the discharge; if higher up in the genital tract a speculum is passed in and then if the cervix is torn and sloughy, it is swabbed over with pure carbolic—but if pus is seen exuding from the uterine cavity then drainage is instituted and this is carried out by means of a glass tube (of which an illustration is given) to the outer end of which is attached a piece of rubber tubing which carries the secretions to the outside.

He closes with a short account of three cases treated by these methods.

J. M. W.

The Treatment of Ischuria Puerperalis.

WALDSTEIN (*Gynækologische Rundschau*, V. Jahrg., 14 Heft) suggests a method for dealing with retention of urine in childbed. He refers to the injection of glycerine into the bladder practised by Baisch and Döderlein for retention after gynæcological operations and to the fact that, as shown by Fromme and Stöckel, after cystoscopy there is apt to be an increased activity of the bladder muscle. This latter condition he thinks is more likely to be due to the glycerine used for lubrication purposes, and this idea he has put into practice in the treatment of retention after labour.

A sterile mixture of glycerine (90—91%) and neutral soap (8—9%) is made up in the form of bougies, in sterile glass tubes 8 cm. long and 6—7 mm. in diameter, which are corked at each end. These bougies he has found germ-free after standing for months. By means of a rod the bougie is forced along the urethra into the bladder.

In 673 labours he found retention 54 times. In 50 of these cases the bougie was employed. In 43 of these its introduction was followed by a spontaneous evacuation of urine, in the majority of cases within a quarter of an hour. In 2 cases two bougies were necessary.

The method failed only 5 times. In the majority of the cases the patients were able to evacuate without any further trouble after the single employment of the bougie.

J. Y.

Sudden Death during the Puerperium.

ANDBERT and BERNEY (*Soc. Obst. Toulouse*, 1911, vol. xiii, No. 2, p. 72). The case is reported of a woman who died suddenly, 16 days after labour, from no ascertainable cause. The clinical facts may be briefly summarised as follow: The patient, aged 20, was delivered at term of a living child. This was the second confinement. Labour was rapid and only lasted 3 hours. There were no complications but some shreds of membrane were left behind. The temperature rose on the 4th and 5th days and the lochia became offensive. The uterus was evacuated and from that time nothing abnormal occurred. On the 16th day after delivery however the patient got up for the first time and died suddenly after walking about for a few minutes. The postmortem examination revealed no abnormality of the lungs or brain. There were however some pleural adhesions on the left side. There was no sign of any thrombus, or embolus. The heart was fatty but otherwise natural. The pelvic organs also were natural. The authors came to no conclusion as to the cause of death, but remark that according to Lacassage and Martin pleural adhesions are very frequently found in cases of sudden death.

J. B.

Puerperal Insanity.

Cazanose and Voivenal (*Soc. Obst. Toulouse*, 1911, vol. xiii, No. 2, p. 67). The authors describe several such cases and from a consideration of these conclude that puerperal insanity may result from three distinct causes, i.e., heredity, infection, and toxæmia.

Some cases are quoted in detail to bear out these views. It is to be noted that most of the cases were primiparæ. J. B.

Puerperal Psychoses.

Picqué (*L'Obstetrique*, July, 1911) maintains that post-partum psychoses, when characterized by prexia, are always septic and should be treated in hospitals and not sent to asylums. Such cases are those of women suffering from septicæmia complicated by delirium. Certainly all women suffering from puerperal sepsis do not become delirious, there is some other factor required to produce that symptom. Many such women suffer from hereditary taint of insanity : they are so unstable as merely to require an occasion to make them delirious. In the cases of non-febrile psychoses melancholia is the predominant feature and the type approaches that of those arising in pregnancy. In the febrile cases hallucinations of what he calls oneiric character are typical, but there may be maniacal outbursts without hallucination.

In regard to prognosis it must be remembered that women showing symptoms of confused hallucinations are evidently suffering from a form of sepsis which is often fatal : similarly stupor is a symptom of grave significance. Melancholia of late onset is not so fatal to life, seeing that the infective process is not so acute, but as regards recovery of the mental condition the prognosis is not good. Chronicity and the previous psychopathic condition are the chief factors to be considered. The patients suffering from pyrexia are to be treated as cases of puerperal sepsis without regard to the mental condition. Apyretic cases require asylum treatment.

E. H. L. O.

Salvarsan Injected into a Mother during Lactation.

Jeanselms (*Ann. de Gyn. et d'Obstét.*, July, 1911) reports four cases and has collected other recorded cases where congenital syphilis has been treated in the child by giving the mother "606." He considers the result good in six cases and unsatisfactory in ten.

He thinks that the milk from a mother recently injected with "606" has a beneficial influence on infants with superficial (cutaneous) manifestations of syphilis. These clear up with great speed in many cases, but relapses occasionally occur.

Treatment through the milk is not a success where gross visceral lesions are present. Mercurial rubbings are better in such cases.

It is interesting to note that analysis of the milk either fails to show the presence of arsenic at all or else only in the most minute quantity, so that the cases which improve during treatment through the milk are influenced by antitoxic bodies formed in the mother's system in response to the large amount of endotoxin set free in the spirochaetes killed by the salvarsan.

Two points of some importance are brought out in the article; one is that one infant showed signs of active syphilis after being suckled for 3 months by a mother who during that period received no less than 1·5 grammes of the drug. The other is that the infant's temperature may rise immediately the mother receives her injection.

C. W.

Placenta Prævia—a Warning.

J. F. Baldwin, M.D. (*Jour. Am. Med. Assoc.*, vol. lvii, p. 393, 1911). Baldwin cites the following case illustrating the possibility and danger of concealed hæmorrhage after the leg has been brought down by the Braxton-Hicks method.

The patient was a multipara whose previous labours had been easy. Owing to slight hæmorrhages delay was thought inadvisable and she was brought to hospital for delivery, where Baldwin first saw her in consultation. A leg was brought down by the Braxton-Hicks method without difficulty. The parts were dilating nicely; her physician was exerting steady traction which seemed to put a complete stop to hæmorrhage. There had been very little loss. Within an hour Baldwin was sent for suddenly and found the patient dying of collapse. The uterine tumour was much larger than before, so that the diagnosis of internal hæmorrhage was apparent. With traction and pressure from above the child was born in an instant, the birth being followed by an enormous deluge of blood and blood clots. The patient expired a few minutes after.

Since the above was written the papers of the last meeting of the American Gynæcological Society have been published, but none of these papers mention the possibility of concealed hæmorrhage after the leg is brought down, and one paper speaks of the method as completely controlling bleeding.

Had any text book contained any warning of this possibility, the attending physican would have been on his guard and would have recognized the condition before the hæmorrhage had reached a fatal stage.

C. N. L.

Theses reviewed in "L'Obstétrique," July, 1911.

Thèses de Paris, 1910—1911.

Double uterus without hæmatometra. Wolf Stern (No. 89). Not usually diagnosed unless complicated. Conservative surgery, if possible, in pregnancy.

Menstruation and fecundation. Finot (No. 113). A statement of Pinard's views. The follicle ruptures 12—15 days before the menstrual flow. The corpus luteum is a gland of internal secretion : thyro-ovarian antagonism.

Cardiopathy and pregnancy. Corpechot (No. 128). The most important factor in prognosis is an intoxication damaging the myocardium. Induction of labour is contra-indicated in pulmonary œdema : if necessary vaginal Cæsarean section.

Primary epithelioma of ovaries. Chenot (No. 129). Embryonic inclusion of germinal epithelium.

Colpo-hysterectomy in cancer of the cervix. Branlard (No. 135). Duval's modification of Wertheim's operation, consisting in freeing the vagina as first stage.

Ocular troubles in gravidic albuminuria. Burnier (No. 139). 329 observations. Amaurosis, usually transitory and due to chloruræmia; retinitis due to azotæmia, not so grave prognosis as that associated with acute nephritis; optic neuritis often leading to complete blindness. In last two induce labour.

Cystic epitheliomata of the mamma. Jacoulet (No. 141). Histologically malignant, but clinically not so.

Plastic repair of perineum without rectal suture. Fenestre (No. 142). Split up the septum and pull down the untorn rectum.

Sudden death from hypertrophy of thymus in two syphilitic infants. Vacher (No. 148) advises thymectomy.

Criminal abortion and neomalthusianism. Delaplane (No. 150) suggests alterations in Franch law of succession, &c.

Prolapse of funis. Mlle. Kanevsky (No. 151).

Hot air treatment. Gouhot (No. 157) recommends hot air especially in inoperable cancer.

Spontaneous rupture of colloid cysts of ovary. Médevielle (No. 167) says the accident is unimportant and calls for simple ovariotomy only, without drainage.

Unsuccessful vaccination in infants born of mothers vaccinated during pregnancy. Mas (No. 184) puts the proportion of these at about one half : failure is most frequent if the mothers have been vaccinated in the ninth month.

Calcified fibroids of uterus. Bernardie (No. 187) recommends early removal.

Retrodeviation of the mobile uterus. Houttelette (No. 188) recommends Doléris operation—parietal inclusion of the round ligaments.

Cupping of the cervix in metritis. Bonamour (No. 189) recommends this treatment.

Vagino-abdominal hysterectomy in cancer of the cervix. Rabinovitch (No. 194) records 31 cases from the St. Louis Hospital in Paris, and describes the operation in detail, as in No. 135, beginning by freeing the vagina, thus allowing the uterus to be raised, during the abdominal operation, and so permitting the ureter to be easily dissected out.

The state of the liver in recurrent vomiting of infancy with icterus. Mlle. Abramovitch (No. 196).

Delivery in elderly primiparæ. Bonnedame (No. 197) says premature labour is relatively common : delay in first stage not so marked as most authors maintain : observations on 697 cases at Lariboisière.

Congenital tumours of the front of the neck. Dulac (No. 198) from a study of 25 cases says these do not cause much trouble in labour though a goitre may hinder due flexion.

Saint-Lazare. Hospital prison (for prostitutes). Ropitau (No. 199) gives a very interesting account of this institution.

Hæmorrhages of the central nervous system caused by forceps. Ducrotoy (No. 203), after investigating 10 cases in the clinique Baudelocque, concludes that the pressure of the blades causes hæmorrhage at a point distant from the seat of application, i.e., near the base, by forcing the bulb, &c., into the cervical canal.

Prolonged pregnancy, so called. Lavoine (No. 204) does not believe in this as the date of conception may be delayed long after intercourse, especially in nursing women.

Stricture of the urethra, Villfroy (No. 211), is usually traumatic—labour, gonorrhœa, &c.

Suckling—a historical study. Boulan (No. 212) says giving out children to nurse is a produce of civilization and artificial feeding quite modern.

Growth, Baudrand (No. 217) in a work of 650 pages discusses growth in relation to hereditary alcoholism, &c.

Pregnancy in a rudimentary horn. Guillaume (No. 219) thinks that the horn does not open into the uterus, impregnation takes place by way of the tube of the opposite side.

Diabetic vulvitis. Roger (No. 221).

Attempts to procure abortion in women who wrongly think themselves pregnant. Percheval (No. 225) has seen 16 cases with six deaths chiefly from mercurial poisoning.

Tears of cervix invading the lower segment. Baudson (No. 226) finds these to be rarely spontaneous, usually due to forcible dilation, e.g., with Bossi.

Mercurial treatment of puerperal infection. Fourrey (No. 227) uses intramuscular injections up to 5 milligrams of sublimate : nephritis contraindicates.

The placenta in twin pregnancies (bi-ovular). Abramovsky (No. 230).

Torsion of fibroid uterus. Tchohadjitch (No. 234) omits consideration of the pregnant uterus.

Late puberty. Duprat (No. 243) finds this associated with early menopause and irregular menstruation.

Primary sarcoma of vagina in the adult. Coulon (No. 245).

Clean milk in large towns. Simacourbe (No. 270).

Rohan's breast pump for cracked nipples. Henry (No. 271) recommends this apparatus as it gives a continuous exhaust without the usual out and in movement of the nipple.

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Lecturer in School Hygiene and the Observation of Children
to the Manchester University.

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